Multi Digital Scroll System

MDS Commissioning Manual

McQuay Air Conditioning

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Introduction

The MDS Commissioning Manual provides a guideline to service personnel to perform start up on the MDS system. Besides providing the details on the system wiring method, termination connection and PCB setting, this manual also consists information and working instruction on the Smart Commander Service Version. The complete list of error code is also provided in this manual with some possible root cause as guidance during troubleshooting.

Commissioning Flow Chart

In order to commissioning MDS, there are some necessary steps to follow. These steps help to streamline the possible problem that may occur during commissioning. Figure 1 provides a general guide line for commissioning MDS system. This is useful whether for first timer as reference or experience technicians / engineers as check list.

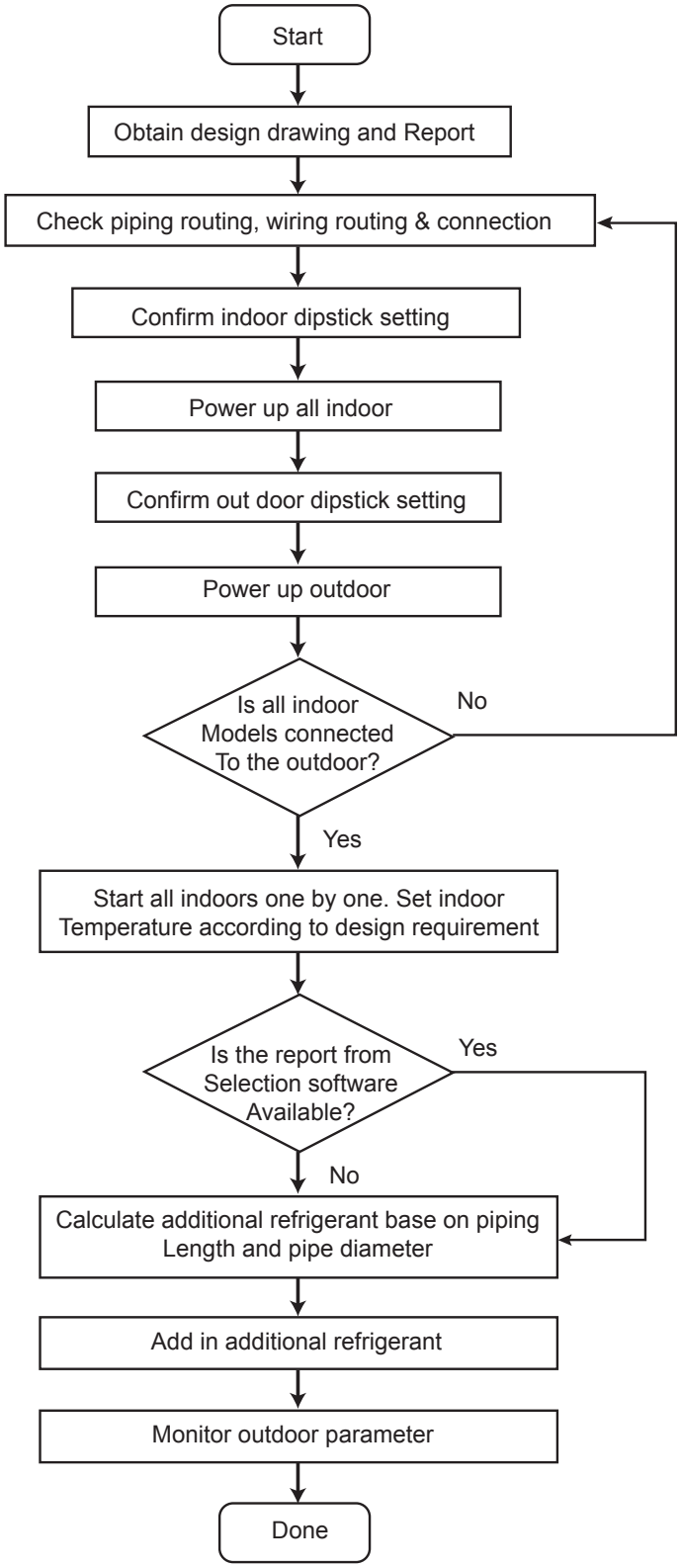


Figure 1 Commissioning Flow Chart

Obtain design drawing and Report

While designing the MDS system using the selection software, the user will draw the equipment layout on the software workplace. After completed the drawing, the software will select the appropriate outdoor model base on the user requirement. (See Figure 2)

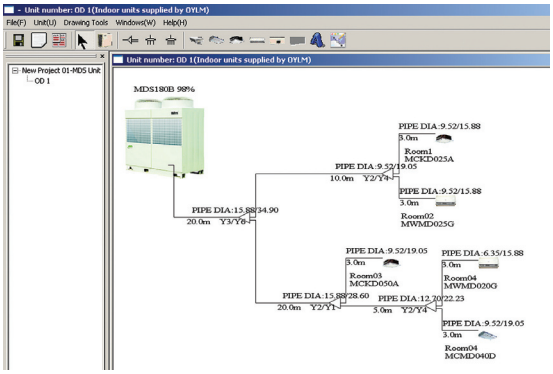
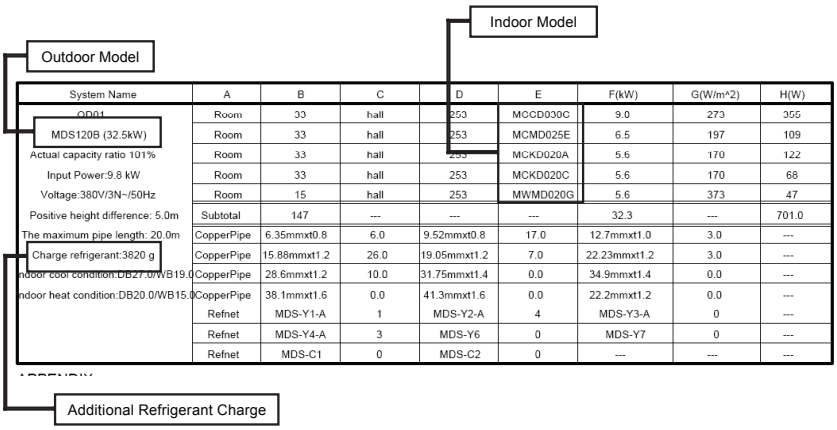


Figure 2 MDS System Layout

Once all this is completed, user will be able to generate the report. Besides that, the user can also generate the equipment layout into a picture file (See Figure 3).



System Name	A	B	C	D	E	F(kW)	G(W/m^2)	H(W)
OD01	Room	33	hall	253	MCCD030C	9.0	273	355
	Room	33	hall	253	MCMD025E	6.5	197	109
	Room	33	hall	253	MCKD020A	5.6	170	122
	Room	33	hall	253	MCKD020C	5.6	170	68
	Room	15	hall	253	MWMD020G	5.6	373	47
	Subtotal	147	---	---	---	32.3	---	701.0
	CopperPipe	6.35mmxt0.8	6.0	9.52mmxt0.8	17.0	12.7mmxt1.0	3.0	---
	CopperPipe	15.88mmxt1.2	26.0	19.05mmxt1.2	7.0	22.23mmxt1.2	3.0	---
	CopperPipe	28.6mmxt1.2	10.0	31.75mmxt1.4	0.0	34.9mmxt1.4	0.0	---
	CopperPipe	38.1mmxt1.6	0.0	41.3mmxt1.6	0.0	22.2mmxt1.2	0.0	---
	Refnet	MDS-Y1-A	1	MDS-Y2-A	4	MDS-Y3-A	0	---
	Refnet	MDS-Y4-A	3	MDS-Y6	0	MDS-Y7	0	---
	Refnet	MDS-C1	0	MDS-C2	0	---	---	---

Figure 3 MDS Selection Report

Check piping routing, wiring routing & connection

There are few things to check. All this should be done during installation. However, it is better to check all items again before commissioning.

Piping Routing

Ensure both liquid and gas pipe are insulated.

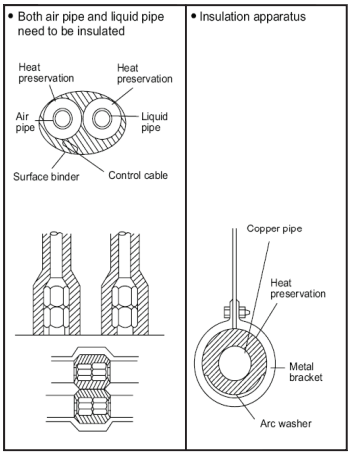


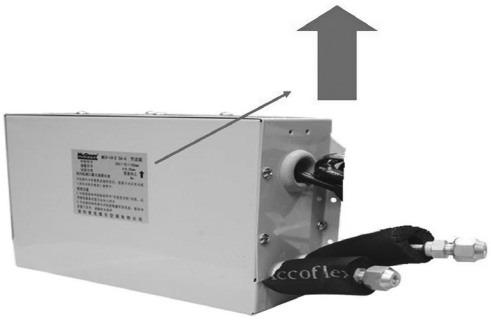
Figure 4 MDS Piping

	Pipe specifications	
	Diameter:6.25 to 25.4mm	Diameter: 28.58 to 41.3 mm
Thickness	At least 10 m	At least 15mm
Heat insulation	At least 100˚C	

Figure 5 Insulation Recommendation

For hot and wet environment, it is recommended to increase the insulation thickness. If there is special request due to customer requirement or country regulation, please follow the specification stated.

The next item that needs to take note will be the installation of the EXV box. Please ensure that the orientation of the EXV box is in vertical condition as shown in Figure 6.



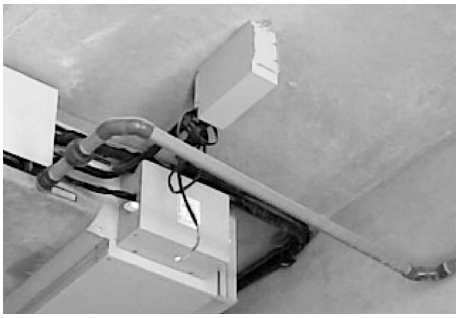


Figure 6 EXV Orientation

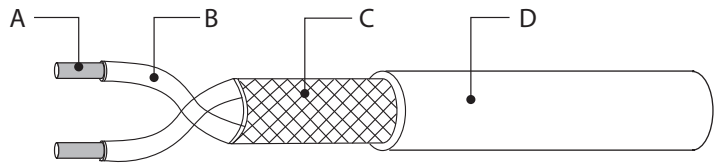
For EXV box selection, it depends on the type of indoor model. Figure 7 shows the EXV against indoor model.

	Liquid Pipe Diameter (Inch)		MEX Model	
Indoor Model	**R-22**	**R-410A**	**R-22**	**R-410A**
MWMD 009G	1/4	1/4	MEX-15-2SAP-D	
MWMD 009G	1/4	1/4	MEX-15-2SAP-D	
MWMD 015G	1/4	1/4	MEX-15-2SAP-D	
MWMD 020G	1/4	1/4	MEX-18-2SAP-D	
MWMD 025G	3/8	1/4	MEX-18-3SAP-D	MEX-22-2SAP-D
MCKD 010C	1/4	1/4	MEX-15-2SAP-C	
MCKD 015C	1/4	1/4	MEX-15-2SAP-C	
MCKD 020C	1/4	1/4	MEX-18-2SAP-C	
MCKD 020A	1/4	1/4	MEX-18-2SAP-C	
MCKD 025A	3/8	1/4	MEX-18-3SAP-C	MEX-22-2SAP-C
MCKD 030A	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCKD 040A	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCKD 050A	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 010C	1/4	1/4	MEX-15-2SAP-C	
MCCD 015C	1/4	1/4	MEX-15-2SAP-C	
MCCD 020C	1/4	1/4	MEX-18-2SAP-C	
MCCD 025C	3/8	1/4	MEX-18-3SAP-C	MEX-22-2SAP-C
MCCD 028C	-	3/8	-	MEX-22-3SAP-C
MCCD 030C	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 038C	-	3/8	-	MEX-22-3SAP-C
MCCD 040C	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 050C	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCCD 060C	1/2	3/8	MEX-24-4SAP-C	MEX-24-3SAP-C
MCMD 015E	-	1/4	-	MEX-15-2SAP-C
MCMD 020E	1/4	1/4	MEX-18-2SAP-C	
MCMD 025E	3/8	1/4	MEX-18-3SAP-C	MEX-22-2SAP-C
MCMD 028E	3/8	3/8	MEX-18-3SAP-C	MEX-22-3SAP-C
MCMD 040D	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCMD 050D	3/8	3/8	MEX-24-3SAP-C	MEX-22-3SAP-C
MCMD 062C	1/2	3/8	MEX-24-4SAP-C	MEX-24-3SAP-C

Figure 7 EXV Box for MDS Indoor from Malaysia

MDS System Wiring

As MDS is a system by itself. The wiring for the system is very critical. Generally, the wiring part can be divided into MDS Outdoor to MDS Indoor wiring and MDS Outdoor to Gateway wiring. The wiring use for both categories will be the same.



Wire Structure

A: conducing wiring (copper, intersection surface is more than 0.5mm^2 or 20AWG
B: Insulation meterial
C: Screen layer (efficiency shall be higher than 95%)
D: Outside layer protector (PVC)

Note:
For wiring cable, refer to UL 2547 and UL2791 standard

Figure 1 Recommended wiring

For the MDS system, the communication protocol is using RS485. There are some limitations on the wiring.

- PC to Gateway – 2m (RS232) (Wiring provided by factory)
- Gateway to Last Outdoor < 1000m (RS485)
- Outdoor to Last Indoor < 1000m (RS485)

MDS Outdoor to Indoor Wiring

As the MDS system is a single outdoor multiple indoors system, it is required to have communication wiring between the outdoor and all indoors. The wiring is required to be connected serially (Daisy chain) inside a conduit. (See Figure 2) Please take note that the communication wiring cannot mix inside a same conduit with power supply.

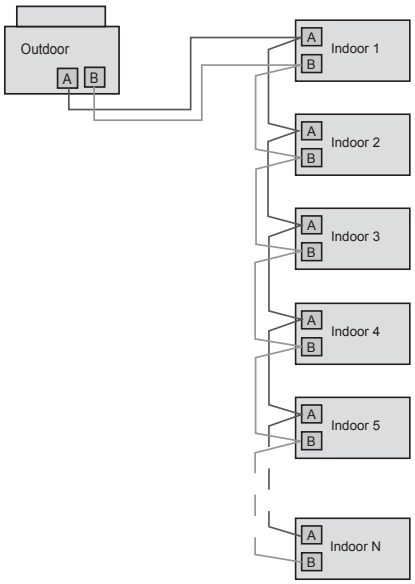


Figure 2 MDS outdoor to indoor Communication Wiring

Figure 1 shows the type of wiring that the factory recommends for MDS communication wiring. A screen cable is recommended because the screen cable will help to filter the electrical noise along the communication wiring and thus help to maintain stability on the communication.

For outdoor model, there are two type of outdoor board. The wiring connection from the outdoor PCB to indoors is slightly different. The terminal to be connected on the outdoor PCB are labeled as A_{in} and B_{in}.

- Type 1 - MDS030-070A/AR (MDS-A board)
- Type 2 - MDS080-320B/BR (MDS-B Board)

For MDS A series, there are two wiring connectors located at the bottom left of the PCB, one of it is green colour and the other is orange color. For outdoor to indoor communication, the communication wire need to be connected to the green terminal. The label of the terminals are A_{in} and B_{in}.

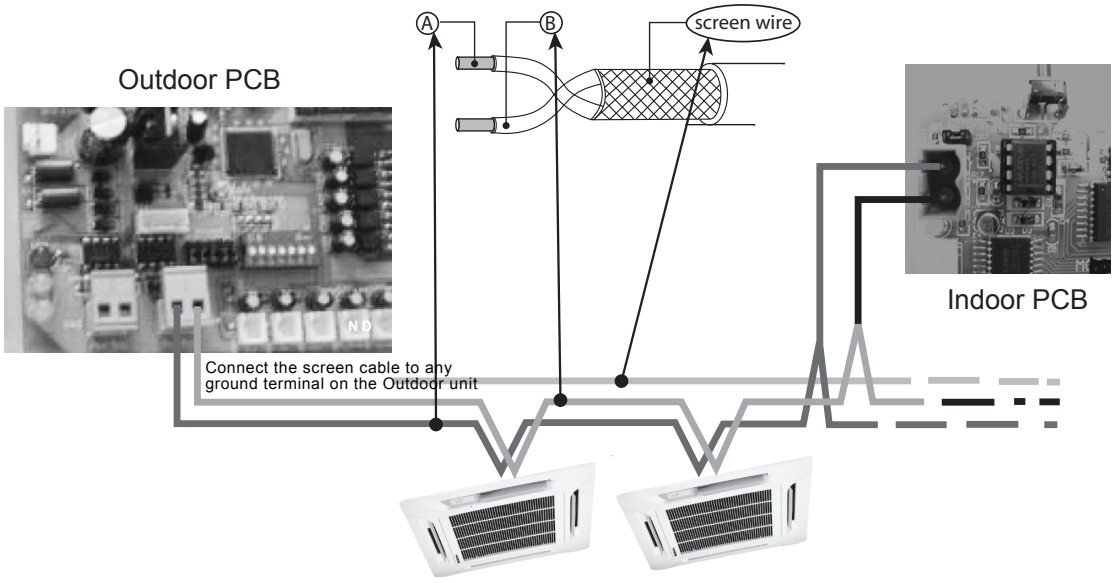


Figure 3 MDS A Series Outdoor to Indoor Connection

For MDS B Series, for MDS B Series, the A_{in} and B_{in} terminals are alreadywired from the PCB to terminal block. Different model has different terminal number.

R-22 Model	Terminal Number for A_{in}	Terminal Number for B_{in}
MDS080/100/120/150B/BR	30	31
MDS180/200/220/240B/BR	45	46

R-410A Model	Terminal Number for A_{in}	Terminal Number for B_{in}
5MDS080/100/120/140/160/180B/BR	30	31
5MDS200/220/240B/BR	45	46

Figure 4 MDS B Series Terminal Number References

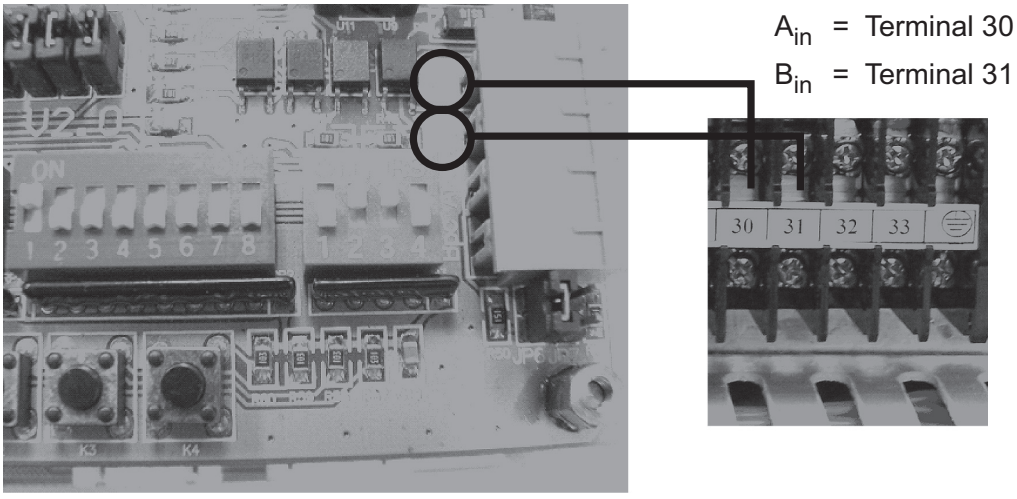


Figure 5 MDS 080/100/120/150B/BR Communication Terminals

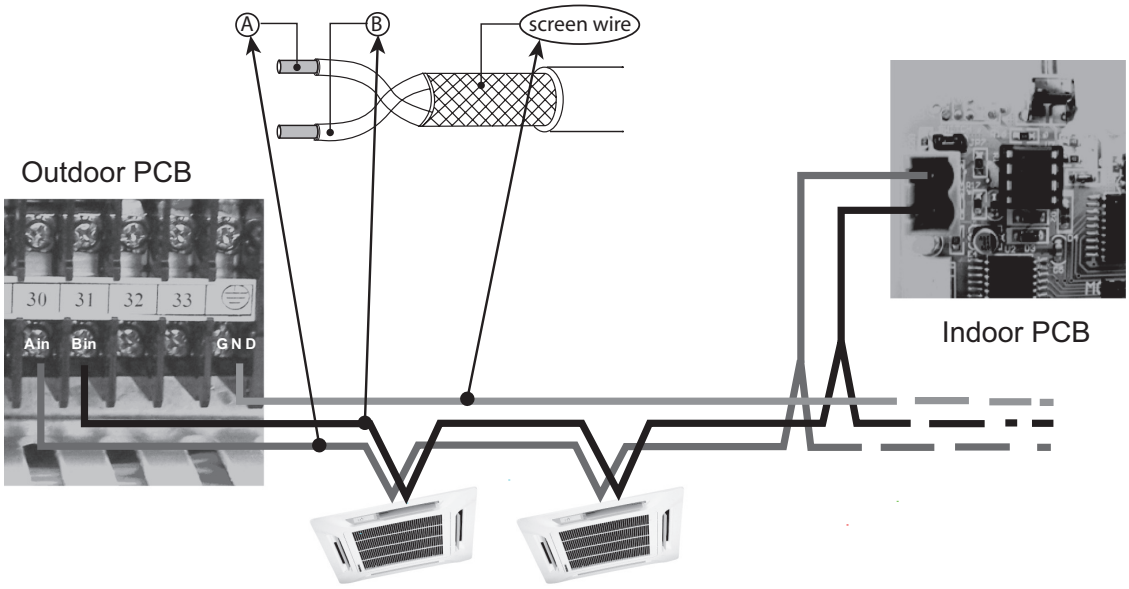


Figure 6 MDS B Series Outdoor to Indoor Connection

For master & slave model, the communication connection is slightly different. From the master unit A_{in} & B_{in}, the communication wiring need to connect to the salve unit A_{pc} & B_{pc} before connect to the indoors. Similarly, to ease installation, these communication terminals are already wired from the PCB to terminal block. Different model has different terminal number.

R22 Model	Master Model	Salve Model
MDS 260B/BR	MDS 120B(R)M	MDS 150B(R)S
MDS 280B/BR	MDS 130B(R)M	MDS 150B(R)S
MDS 300B/BR	MDS 150B(R)M	MDS 150B(R)S
MDS 320B/BR	MDS 160B(R)M	MDS 160B(R)S

R22 Model (Master Unit)	Terminal Number for A_{in}	Terminal Number for B_{in}
MDS120/130/150/160BM/BRM	30	31

R22 Model (Slave Unit)	Terminal Number for A_{pc}	Terminal Number for B_{pc}
MDS150/160BS/BRS	32	33

Figure 7 MDS B Series Terminal Number References (R22 Master & Slave Combination)

R-410A Model	Master Model	Salve Model
5MDS 260B/BR	5MDS 120B(R)M	5MDS 140B(R)S
5MDS 280B/BR	5MDS 120B(R)M	5MDS 160B(R)S
5MDS 300B/BR	5MDS 120B(R)M	5MDS 180B(R)S
5MDS 320B/BR	5MDS 180B(R)M	5MDS 140B(R)S
5MDS 340B/BR	5MDS 180B(R)M	5MDS 160B(R)S
5MDS 360B/BR	5MDS 180B(R)M	5MDS 180B(R)S
5MDS 380B/BR	5MDS 240B(R)M	5MDS 140B(R)S
5MDS 400B/BR	5MDS 240B(R)M	5MDS 160B(R)S
5MDS 420B/BR	5MDS 240B(R)M	5MDS 180B(R)S
5MDS 440B/BR	5MDS 240B(R)M	5MDS 200B(R)S
5MDS 460B/BR	5MDS 240B(R)M	5MDS 220B(R)S
5MDS 480B/BR	5MDS 240B(R)M	5MDS 240B(R)S
5MDS 500B/BR	5MDS 250B(R)M	5MDS 250B(R)S

R-410A Model (Master Unit)	Terminal Number for A_{in}	Terminal Number for B_{in}
5MDS120/180BM/BRM	30	31
5MDS240/250BM/BRM	45	46

R-410A Model (Slave Unit)	Terminal Number for A_{pc}	Terminal Number for B_{pc}
5MDS140/160/180BS/BRS	32	33
5MDS200/220/240/250BS/BRS	47	48

Figure 8 MDS B Series Terminal Number References (R410 Master & Slave Combination)

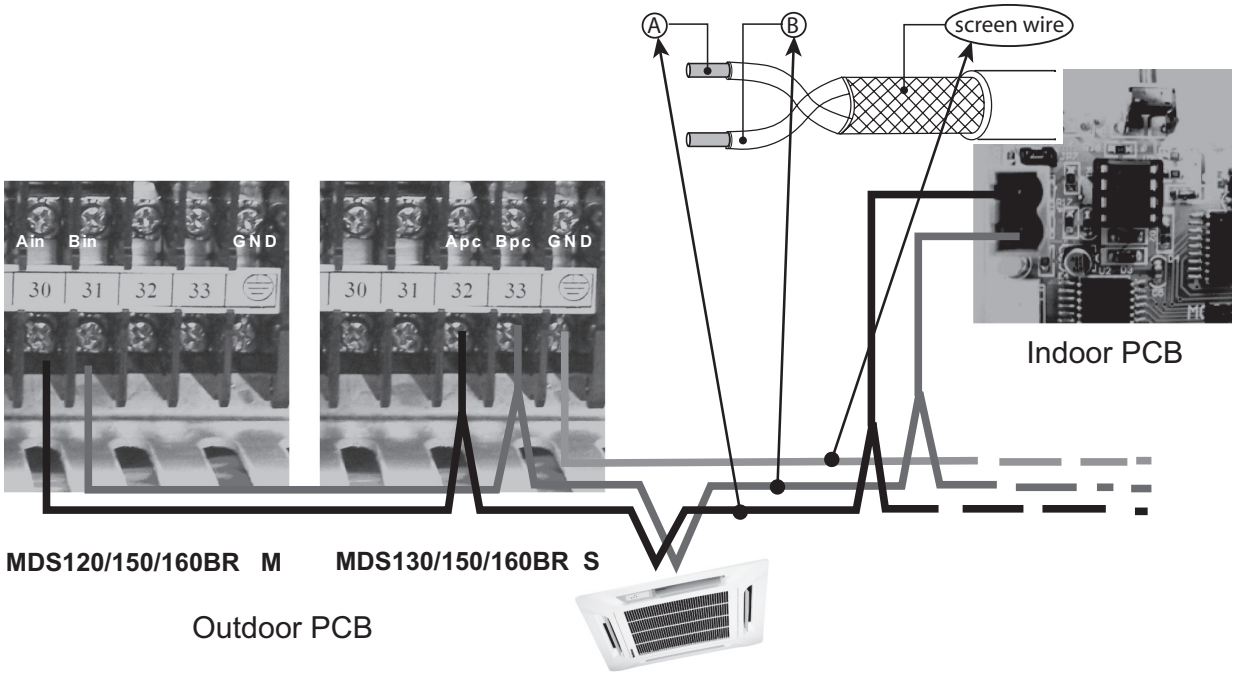


Figure 9 MDS B Series Outdoor to Indoor Connection (Master & Slave Combination)

For the indoor PCB, there are two Ain and Bin terminal. One of the terminal is green colour and the other is orange colour. For the outdoor to indoors communication wiring, the wire need to be terminate on the green colour terminal. The orange terminal is used for other purpose.

Note: The orange colour terminal may or may not be available depending on the hardware version of the PCB.

For the last indoor unit, the communication jumper needs to be shorted. (See Figure 10) This is to indicate to the outdoor unit that this is the last indoor unit. If the jumper is not shorted, the communication between the outdoor and indoor is not stable. It may cause the outdoor model to trip after some time of operation. For Indoor PCB shown in Figure 11 and 12, the communication jumper is labeled with the name JP1. The location are shown below.

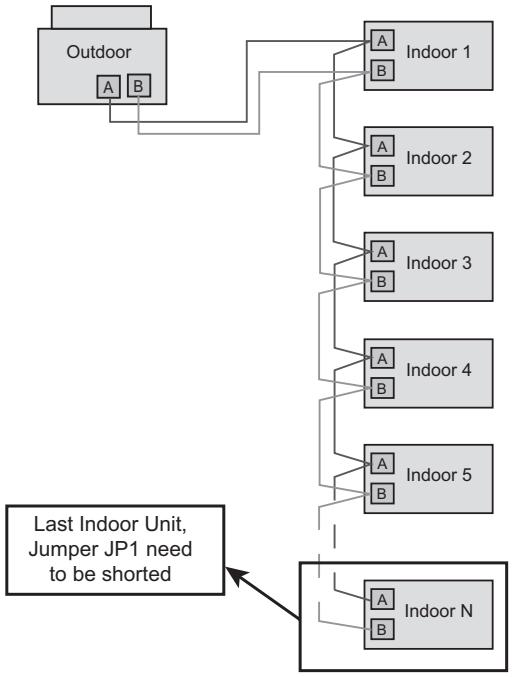


Figure 10 MDS Outdoor to Indoor Communication Wiring

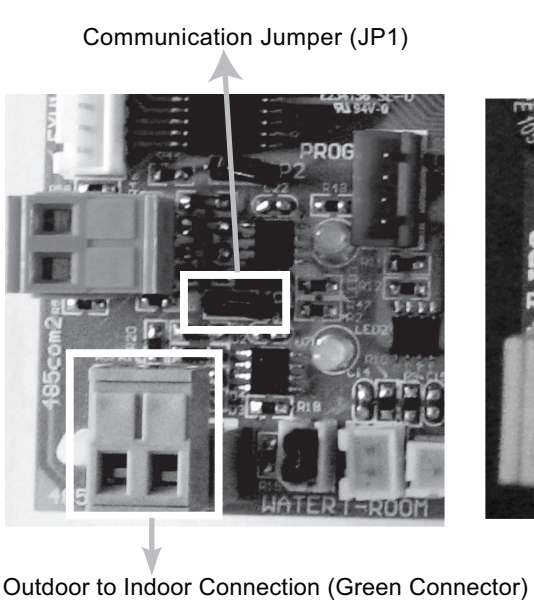


Figure 11 Location of Jumper JP1 on Standard MDS Indoor PCB

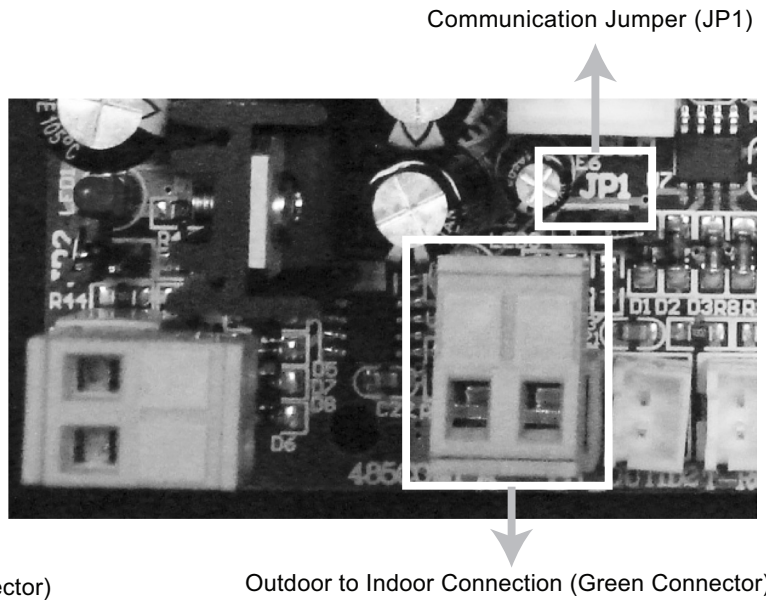


Figure 12 Location of Jumper JP1 on MDS Wall Mounted Size 20 & 25 PCB

MDS Gateway to Outdoor Wiring

For outdoor wiring connection, it is only required when there is a series of outdoors connected and control by the central control and monitoring software. The type of wiring will be similar to those used in the indoor to outdoor communication.

For outdoor model, there are two type of outdoor board.
The terminal is labeled with A_{pc} & B_{pc}. The location of the terminal varies base on type of outdoor PCB as mention before.
Type 1 - MDS030-070A/AR (MDS-A board)
Type 2 – MDS080-320B/BR (MDS-B Board)

For MDS A series, the outdoor to outdoor communication wire will need to be terminate on the orange terminal. The connection is shown as Figure 13.

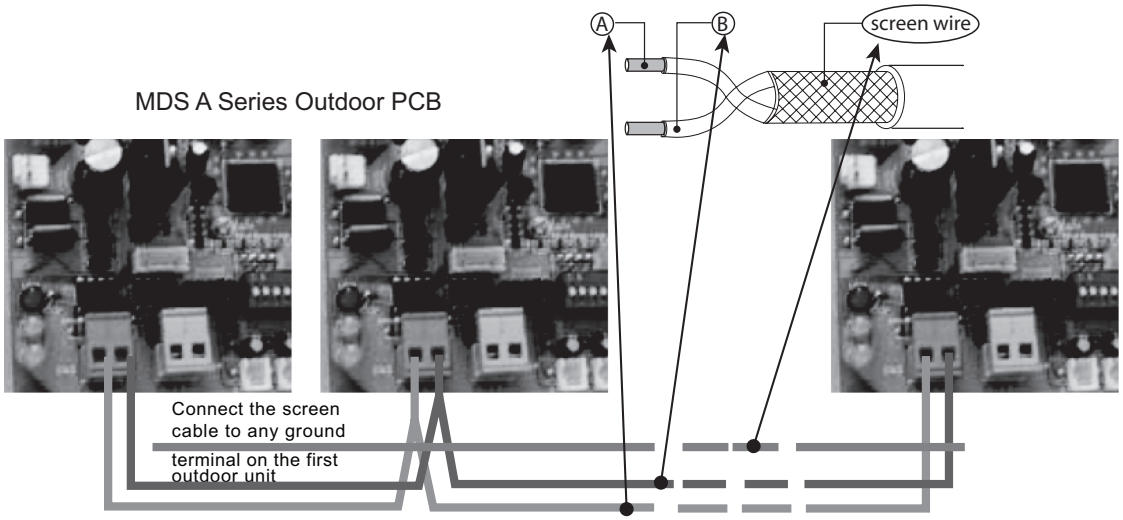


Figure 13 MDS A Series Outdoor Connections

For the last MDS Outdoor A series, the jumper JP1 and JP2 needs to be shorted. The jumpers is just above the orange and green colour terminal.

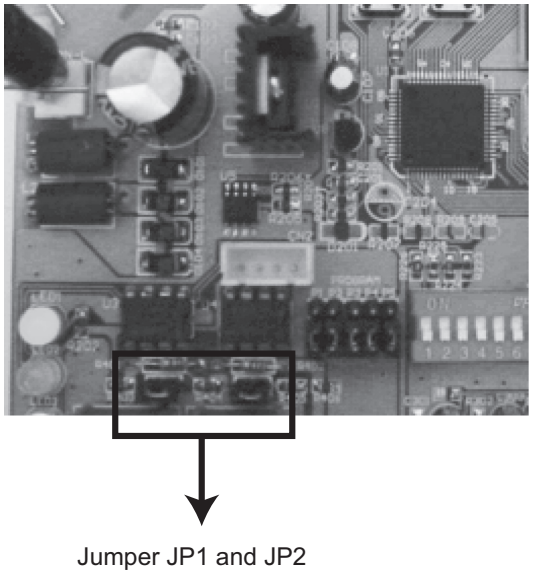


Figure 14 Location of Jumper JP1 & JP2 in Outdoor MDS A Series PCB

While using the smart commander (Central Control & Monitoring Software) or the commissioning software, the outdoor need to be connected to the gateway first before connect to the computer (either a desktop or a laptop). (See Figure 15)

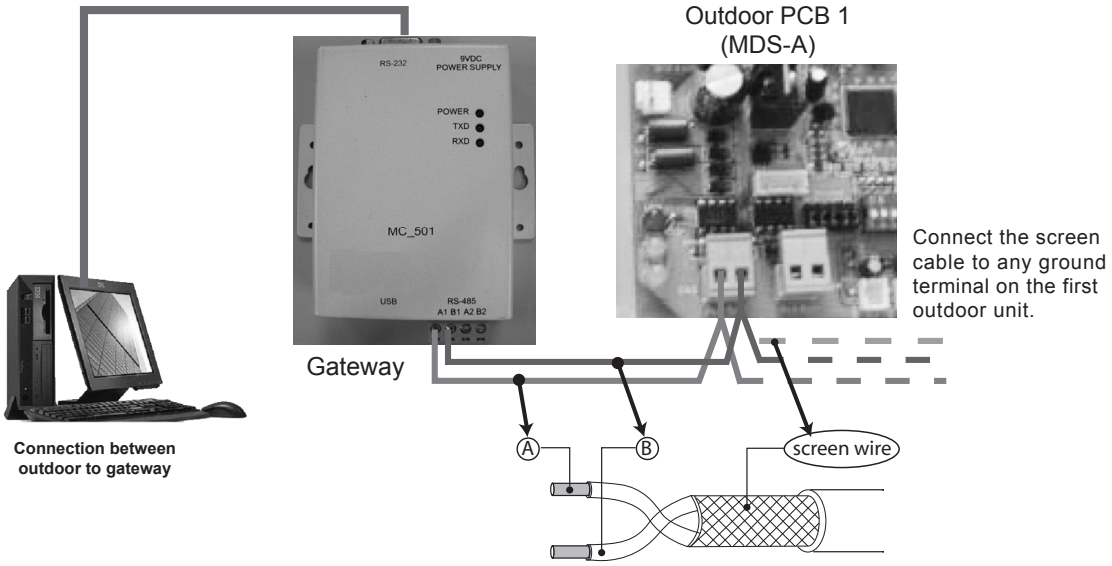


Figure 15 MDS A Series Outdoor Connections Smart Commander Gateway

For MDS B series, the wiring connection to link all the outdoor together is different. As mention in the indoor to outdoor connection for MDS B series, the terminal on the PCB (Apc and Bpc) is already wired to a set of terminal block, allowing easier access to perform the wiring connection. Different model will have different terminal.

R-22 Model	Terminal Number for A_{pc}	Terminal Number for B_{pc}
MDS080/100/120/150/260/280/300/320B/BR	32	33
MDS180/200/220/240B/BR	47	48

R-410A Model	Terminal Number for A_{pc}	Terminal Number for B_{pc}
5MDS080/100/120/140/160/180/260/280/300/320/340/360B/BR	30	31
5MDS200/220/240/380/400/420/440/460/480/500B/BR	47	48

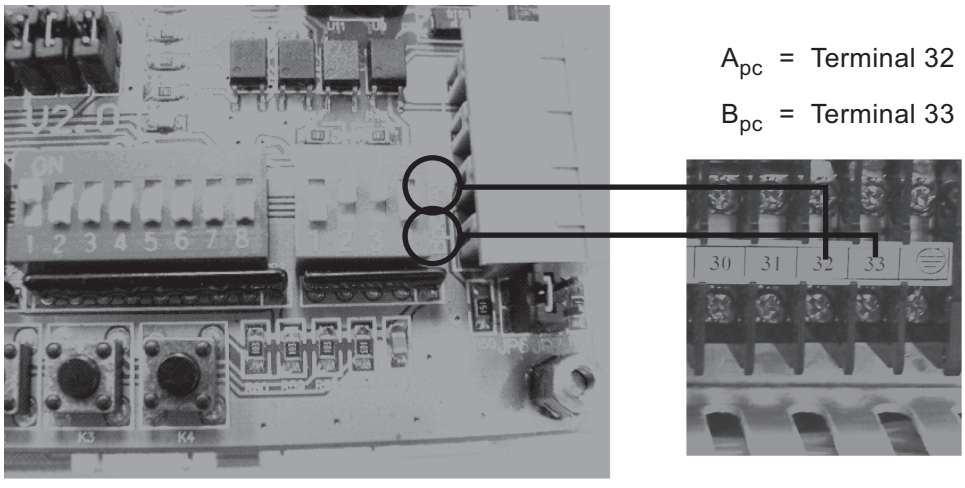


Figure 16 MDS 080/100/120/150B/BR Communication Terminals

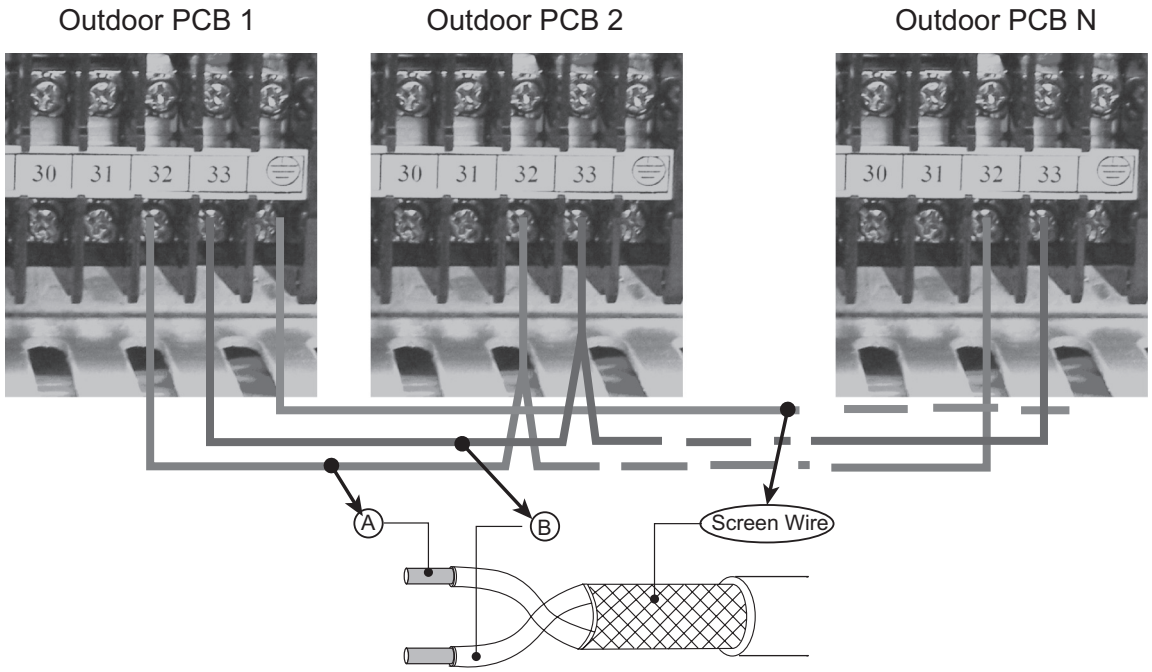


Figure 17 MDS B Series Outdoor to Outdoor Connection

For master and slave model, the connection between master and slave is already done during master-salve outdoor to the indoors.

For the last MDS B series outdoor, the jumper JP6 needs to be jumped. This is to indicate to the software that this is the last outdoor unit. The connection is shown in Figure 18.

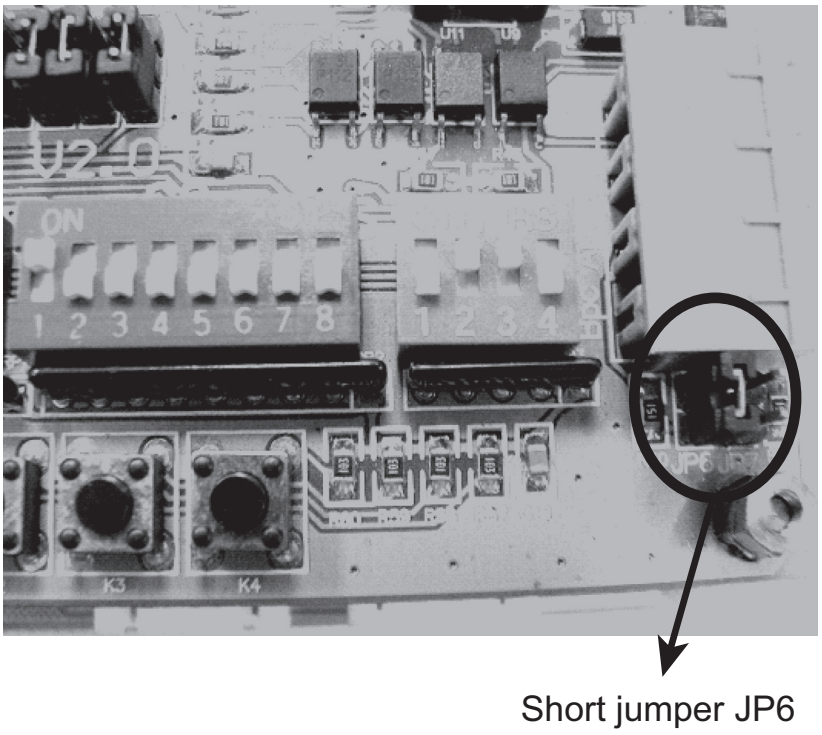


Figure 18 Location of Jumper JP6 in Outdoor MDS B Series PCB

Similar, while using the smart commander (Central Control & Monitoring Software) or the commissioning software, the outdoor need to be connected to the gateway before then only connect to the computer (either a desktop or a laptop). (See Figure 19)

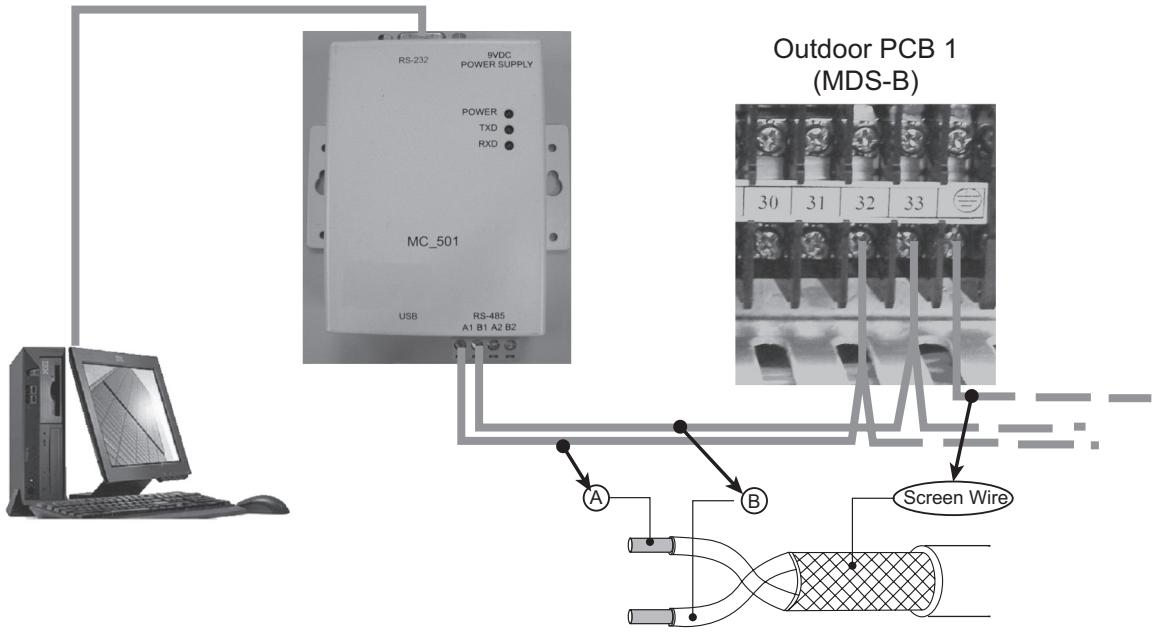


Figure 19 MDS B Series Outdoor Connections to Gateway

MDS PCB

For MDS system, the units, both indoor and outdoor setting are preset and tested before they are shipped out from the factory. However, it is advisable to reconfirm the setting on the setting before any commissioning. Before one can start checking on the PCB setting, it is important to know the location of the dip switch and every dipswitch function.

MDS Indoor PCB Setting

For MDS indoor, there all 4 type of setting need to be determined. They are:

a) Indoor Type
b) Indoor Capacity
c) Indoor Address
d) Indoor Function

There are two type of indoor PCB. However, the dipswitch location and function is the same.

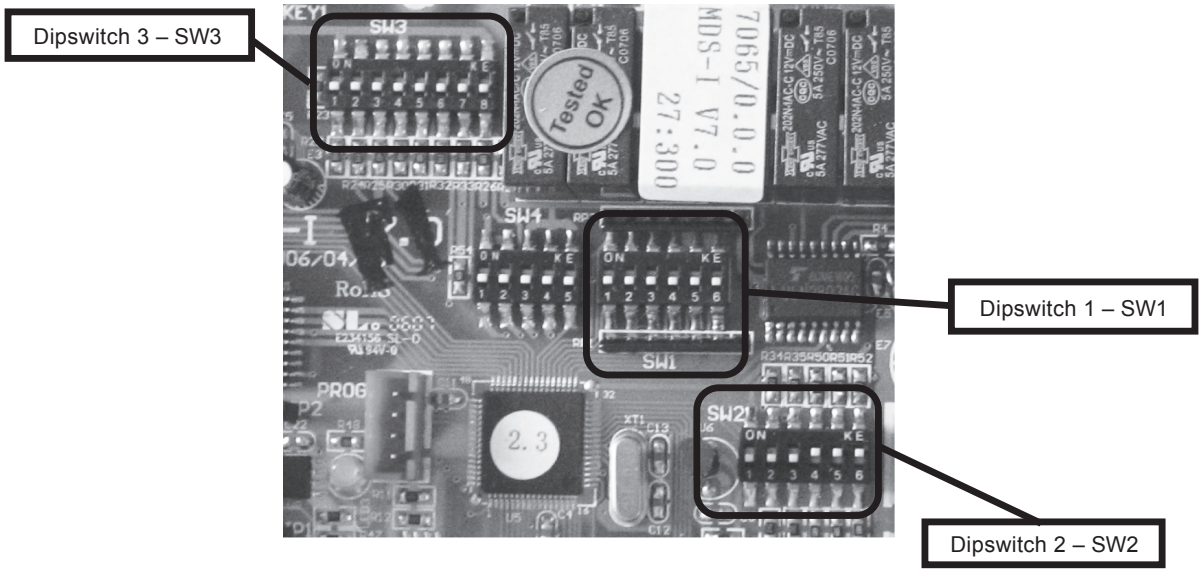


Figure 1A Dipswitch Location for Standard MDS Indoor PCB

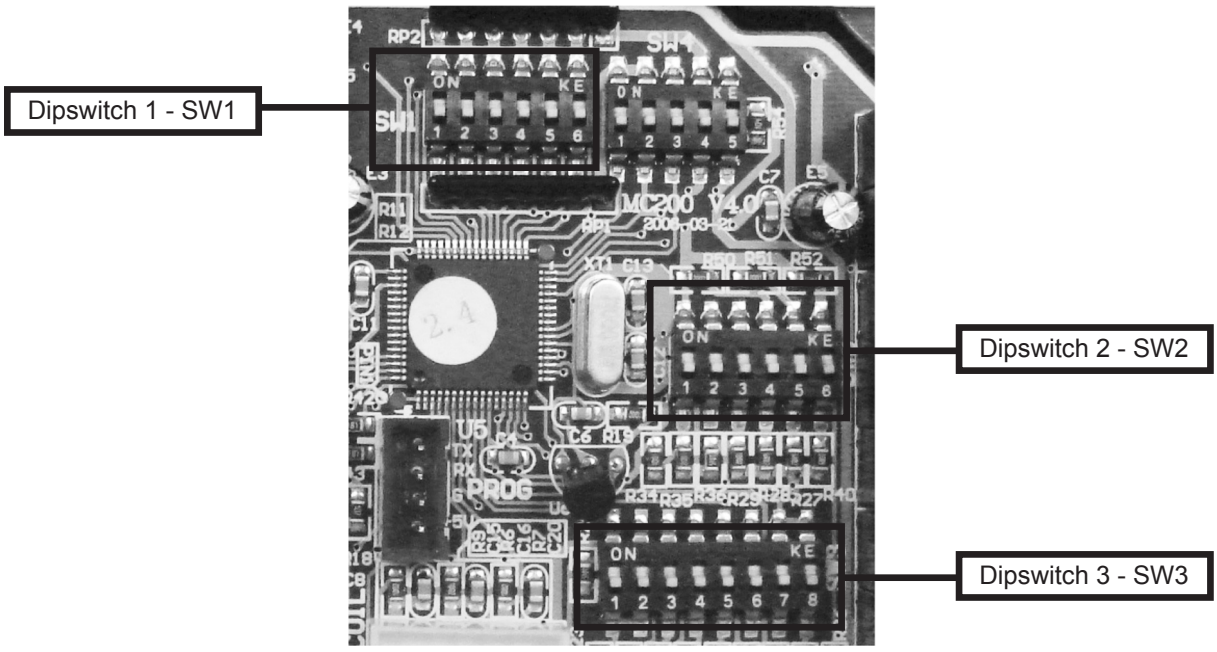


Figure 1B Dipswitch Location for MDS Wall Mounted Size 20 & 25 PCB

Dipswitch 1 (SW1)

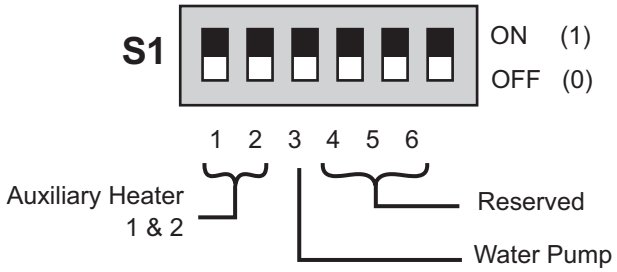
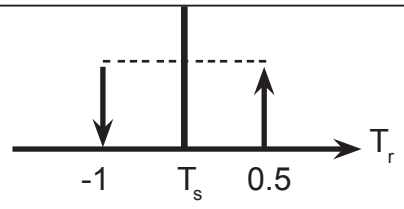


Figure 2 Dipswitch 1 (SW1)

Dipswitch 1 (SW1) is used to determine the special function of the indoor unit. There are 2 main special functions that can be specified in MDS indoor unit. The first function is the heater function. This heater option is only applicable for ducted model (using wired controller) and it will function during heating cycle or fan mode.

Locating the dipswitch S1.1 and S1.2 to **ON** position will give the PCB ability to control the heater relay. The PCB is allows to connect to 2 heaters. If only 1 heater is available, just locate S1.1 to **ON** position. If 2 heaters are used, both S1.1 and S1.2 need to be located to **ON** position.
The control algorithm of the heaters is shown below:



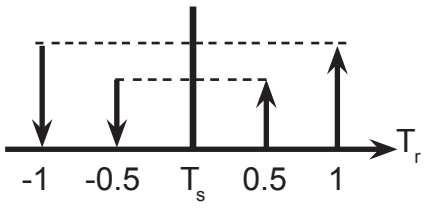
When the set temperature (T_s) is higher than room temperature (T_r) by 0.5°C, the heater will be turned **ON**.

(T_s - T_r > 0.5)

When the set temperature (T_s) is lower than room temperature (Tr) by 1°C, the heater will be turned **OFF**.

(T_s - T_r < -1)

Figure 3 Heater Algorithm – 1 Heater Only



Heater 1
When the set temperature (Ts) is higher than room temperature (Tr) by 0.5°C, the heater will be turned **ON**.

(T_s - T_r > 0.5)

When the set temperature (Ts) is lower than room temperature (Tr) by 0.5°C, the heater will be turned **OFF**.

(T_s - T_r < -0.5)

Heater 2
When the set temperature (Ts) is higher than room temperature (Tr) by 1°C, the heater will be turned **ON**.

(T_s - T_r > 1)

When the set temperature (Ts) is lower than room temperature (Tr) by 1°C, the heater will be turned **OFF**.

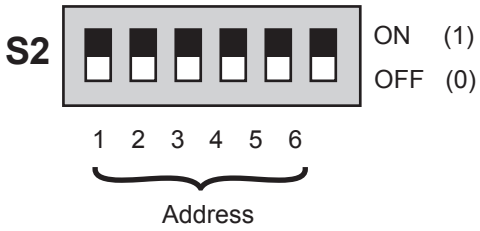
(T_s - T_r < -1)

Figure 4 Heater Algorithm – 2 Heaters

For dipswitch S1.2 (Water Pump), it will be set to **ON** position for all ceiling cassette unit. The drain pump will operate when the indoor unit is turned **ON**. The water pump will stop operation if the water level sensor become **OPEN** condition.

For dipswitch S1.4 until S1.6, currently is reserve for future used.

Dipswitch 2 (SW2)



Dipswitch 2 (SW2)

Dipswitch 2 (SW2) is used for address setting. Each indoor unit within the same outdoor unit must have different address. Figure 6 shows the indoor address setting.

S2.1	S2.2	S2.3	S2.4	S2.5	S2.6	Indoor Address
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
0	0	0	1	0	0	4
0	0	0	1	0	1	5
0	0	0	1	1	0	6
0	0	0	1	1	1	7
0	0	1	0	0	0	8
0	0	1	0	0	1	9
0	0	1	0	1	0	10
0	0	1	0	1	1	11
0	0	1	1	0	0	12
0	0	1	1	0	1	13
0	0	1	1	1	0	14
0	0	1	1	1	1	15
0	1	0	0	0	0	16
0	1	0	0	0	1	17
0	1	0	0	1	0	18
0	1	0	0	1	1	19
0	1	0	1	0	0	20
0	1	0	1	0	1	21
0	1	0	1	1	0	22
0	1	0	1	1	1	23

S2.1	S2.2	S2.3	S2.4	S2.5	S2.6	Indoor Address
0	1	1	0	0	0	24
0	1	1	0	0	1	25
0	1	1	0	1	0	26
0	1	1	0	1	1	27
0	1	1	1	0	0	28
0	1	1	1	0	1	29
0	1	1	1	1	0	30
0	1	1	1	1	1	31
1	0	0	0	0	0	32
1	0	0	0	0	1	33
1	0	0	0	1	0	34
1	0	0	0	1	1	35
1	0	0	1	0	0	36
1	0	0	1	0	1	37
1	0	0	1	1	0	38
1	0	0	1	1	1	39
1	0	1	0	0	0	40
1	0	1	0	0	1	41
1	0	1	0	1	0	42
1	0	1	0	1	1	43
1	0	1	1	0	0	44
1	0	1	1	0	1	45
1	0	1	1	1	0	46
1	0	1	1	1	1	47

Figure 6 MDS Indoor Address Reference

While setting the indoor address, there are a few rules need to follow. The rules are as follow:

a) Each indoor number must be unique. The indoor address cannot duplicate.
b) The first indoor address must be 0. Do not start the first indoor with address 1.
c) While setting the indoor address, the indoor address number cannot skip. For example, if there are only 4 indoors in a system, the indoor address needs to be 0, 1, 2 and 3.
d) It is advisable that the indoor address follow the sequence of the communication wiring. For example, for a 4 indoors in the system, the first indoor after the outdoor should have address 0, the next indoor address should be 1 and the last indoor of the communication wiring should be 3.

Example:

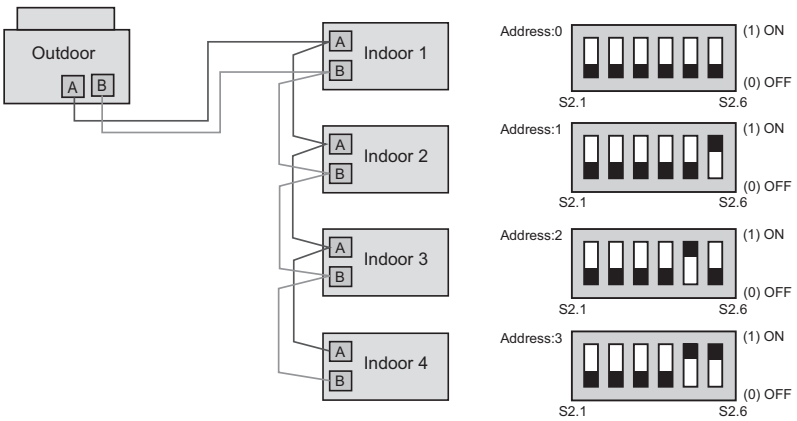


Figure 7 MDS Indoor Address Example

Dipswitch 3 (SW3)

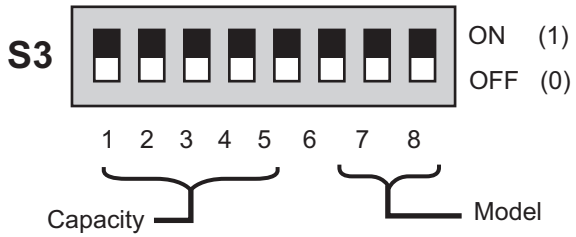


Figure 8 Dipswitch 3 (SW3)

Dipswitch 3 (SW3) is used for model and capacity setting. Usually, when the unit is shipped out from factory, the setting is already done. However, it is advisable that the commissioner to check all indoors during every commissioning. Figure 9 and Figure 10 shows the respective setting for indoor type and indoor capacity. The indoor capacity and model capacity setting shown in Figure 9 & 10 is applicable for R22 and R410A model.

DIP SWITCH S3 (S1-S5)

S3.1	S3.2	S3.3	S3.4	S3.5	CAPACITY (KW)	MODEL NAME
0	0	0	1	0	2.5	09
1	0	1	1	0	2.8	10
0	0	1	0	0	3.6	15
0	1	0	0	0	5.6	20
0	1	0	1	0	6.5	25
1	1	0	1	0	8.0	28
1	1	1	0	0	9.0	30
0	1	1	1	0	10.0	38
1	1	1	1	0	11.2	40
1	0	0	1	0	14.0	50
0	1	0	1	1	16.4	60/62
0	0	0	0	1	22.4	80
0	0	0	1	1	28.0	100

MODEL NAME:
Applicable for Wall Mounted, Ceiling Concealed, Ceiling Cassette and Ceiling Convertible

Figure 9 Capacity Setting for MDS Indoor from Malaysia

DIP SWITCH S3 (S6-S8)

S3.6	S3.7	S3.8	INDOOR TYPE
0	0	0	Ceiling Concealed
0	0	1	Ceiling Cassette
0	1	0	Ceiling Convertible
0	1	1	Wall Mounted
1	0	0	Ducted Blower

Figure 10 Model Setting for MDS Indoor from Malaysia

Example:

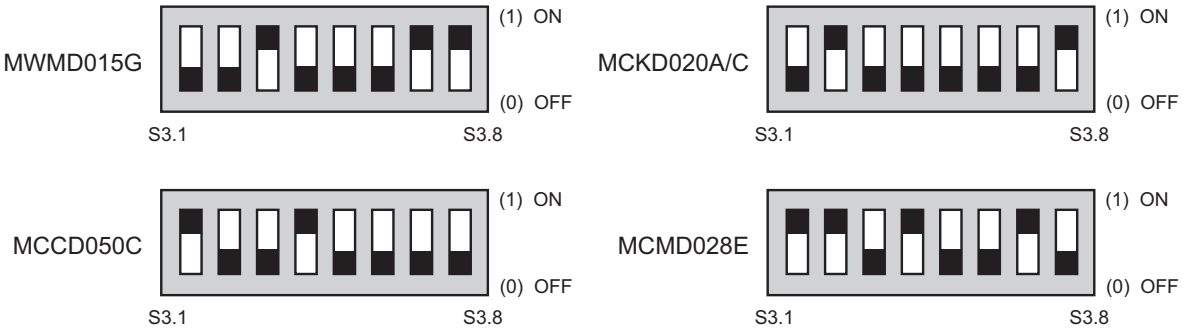


Figure 11 Indoor Model and Capacity Setting Example

Auto-Random Restart

The standard indoor come with auto-random restart disable. There are two type of setting to activate the auto random restart function. For ceiling concealed model which is using the wired controller (MC301), the setting is done on the handset PCB itself. For wireless handset model (wall mounted, ceiling cassette and ceiling convertible), the setting can be done using the wireless handset.

Wired Controller (MC301)

For wired handset (MC301), there are 4 dipswitches on the back of the PCB. Please refer to Figure 12. Once the auto-random restart is set, the LCD of the wired controller will have an indication. (See Figure 13) While changing the setting on the PCB, please make sure the power supply of the indoor is switch off.

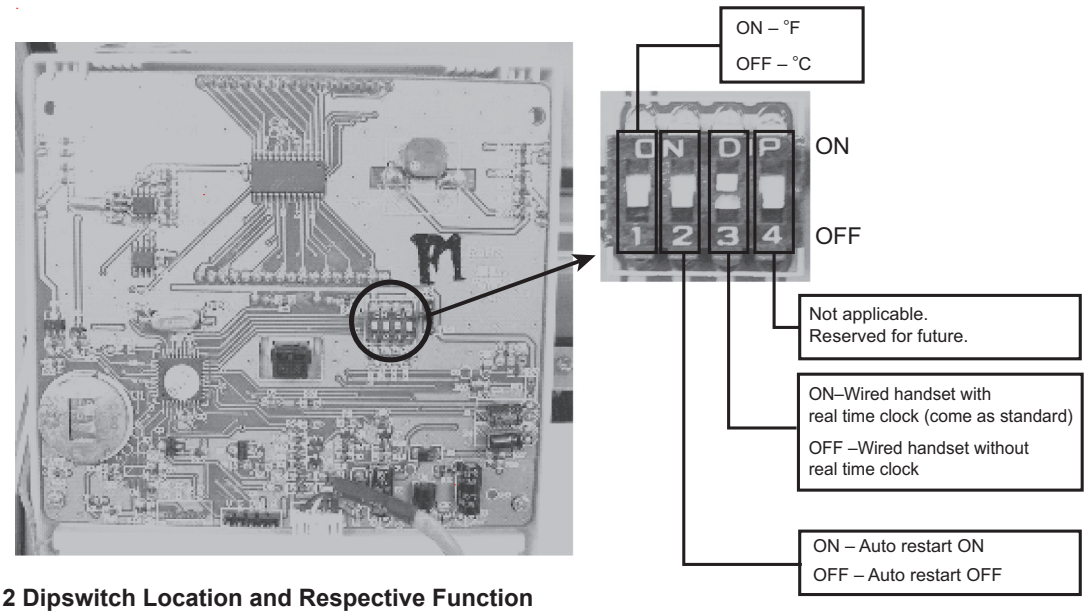


Figure 12 Dipswitch Location and Respective Function

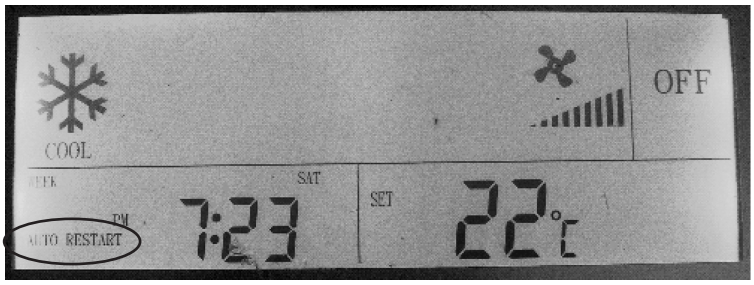


Figure 13 Auto Random Restart Indication

Wireless Handset

To enable auto random restart function on indoor unit using wireless handset, the process will be slightly complicated. The indoor power supply must be available. Handset (G7, G11 or G17) all can be use to do the setting.

To enable Auto Random Restart, the steps are as follow:

1. Press the indoor PCB emergency ON/OFF button for 5 seconds to go into setting mode. When the unit are in setting mode, all the LED of the indoor will be light up
2. Use the wireless handset, select “Fan” mode.
3. Select “High Fan” speed
4. Press the “ON/OFF” button on the wireless handset to complete the setting. Once the setting is complete, all the indoor LED will be turned off and the unit will remain in standby mode.

To disable Auto Random Restart, the steps are as follow:

1. Press the indoor PCB emergency ON/OFF button for 5 seconds to go into setting mode. When the unit are in setting mode, all the LED of the indoor will be light up
2. Use the wireless handset, select “Fan” mode.
3. Select “Medium Fan” speed
4. Press the “ON/OFF” button on the wireless handset to complete the setting. Once the setting is complete, all the indoor LED will be turned off and the unit will remain in standby mode.

Remark: After entering the setting mode (all indoor LED is ON), if there is no operation for 60 seconds, it will automatically exit from setting mode.

MDS Outdoor PCB Setting

Similar to indoor, there are also some setting needs to be done. The unit capacity and model type are usually set before ship out from the factory. However, it is advisable to check on the dip switch again before power up the outdoor.

As for the outdoor address, it is only required when there is a series of outdoors connected and control by the central control and monitoring software.

For outdoor model, there are two type of outdoor board.
Type 1 – MDS030-070A/AR (MDS-A board)
Type 2 – MDS080-320B/BR (MDS-B Board)

MDS A Series

For MDS A series outdoor, there are 2 set of dipswitches. Besides this, there is also a setting mode to modify certain important parameters

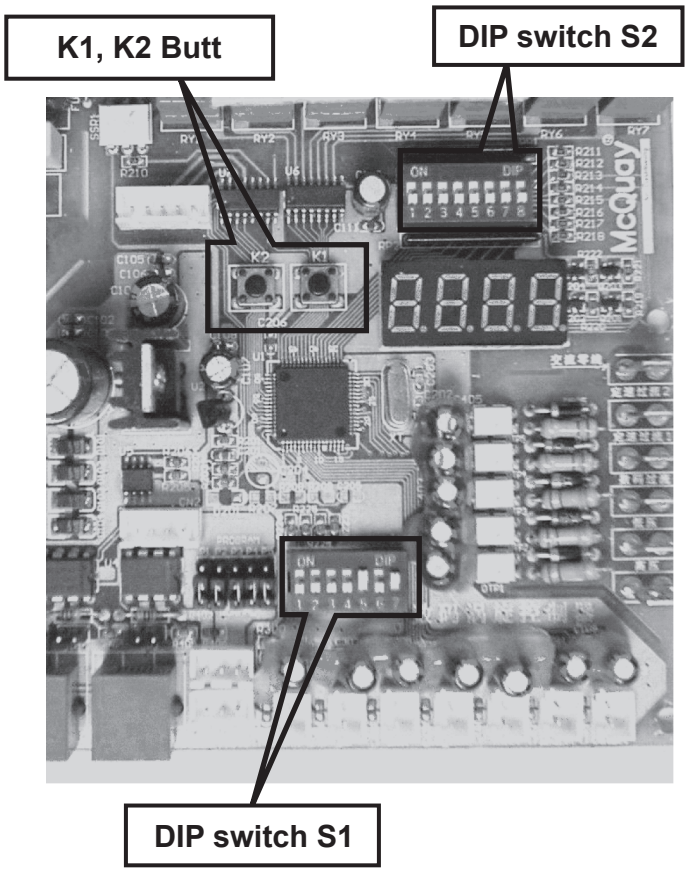


Figure 14 MDS A Series Outdoor PCB

Dipswitch 1

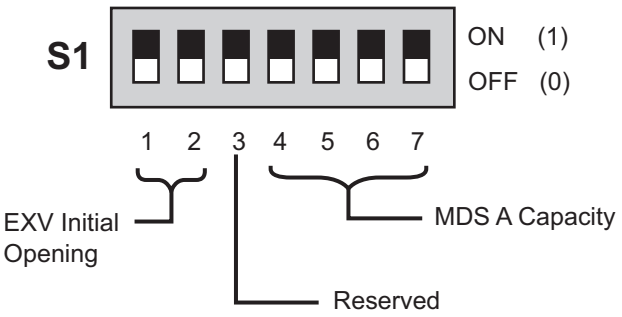


Figure 15 Dipswitch 1

For dipswitch 1, the main function is to determine the MDS-A series outdoor capacity. Dipswitch S1.1 and S1.2 (EXV Initial Opening) is only use by R&D for testing purpose. During site commissioning, it is advisable not alter the setting unless advice from the factory side. Dipswitch S1.3 is reserved for future used. Dipswitch S1.4 to S1.7 is to determine the MDS-A Series capacity. (See Figure 16)

J1.4	J1.5	J1.6	J1.7	MDS-A Capacity
0	1	0	1	**3HP**
0	0	0	0	**4HP**
0	0	0	1	**5HP**
0	0	1	0	**6HP**
0	1	1	0	**7HP**

Figure 16 Dipswitch 1

Dipswitch 2

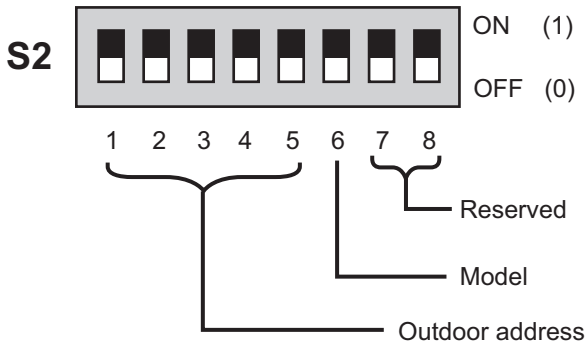


Figure 17 Dipswitch 2

For dipswitch 2, there are 2 main functions. The first will be the type of model (S2.6). and the second will be the outdoor address setting (S2.1 to S2.5). The remaining dipswitches S2.7 and S2.8 are reserved for future provision.

For dipswitches 2.6, model selection, it will determine whether the model is a cooling only model or a heatpump model. This setting is important because the MDS A series PCB is common for both cooling only model and heatpump model. To select a cooling only model, set dipswitch S2.6 to ON position and for heat-pump model, set it to OFF position.

J2.6	MODEL
0	Heatpump
1	Cooling only

Figure 18 MDS A Series Mode Selections

If the outdoor is not connected to the central control monitoring software (Smart Commander) or the Central Wired Controller (MC303), there is no need to set the address. If the outdoor is connected with these accessories, then the same rules on the indoor setting is applied here also. The rules are as follow:

e) Each outdoor number must be unique. The outdoor address cannot duplicate.
f) The first outdoor address must be 0. Do not start the first outdoor with address 1.
g) While setting the outdoor address, the outdoor address number cannot skip. For example, if there are only 4 outdoors in a system, the outdoor address needs to be 0, 1, 2 and 3.
h) It is advisable that the outdoor address follow the sequence of the communication wiring. For example, for a 4 outdoors in the system, the first outdoor after the gateway should have address 0, the next outdoor address should be 1 and the last outdoor of the communication wiring should be 3.

J2.1	J2.2	J2.3	J2.4	J2.5	Outdoor Address
0	0	0	0	0	0
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	30
1	1	1	1	1	31

Figure 19 MDS A Series Outdoor Addresses

After the MDS A Series is powered up, the 7 segment display will show a list of reading. The shown data are stated in Figure 20. It will show the reference (X…) first, then only the value (YYYY).

Outdoor Information / Reading

X - - -	YYYY
0	Compressor Discharge Temp
1	Ambient Temp
2	Compressor Suction Temp
3	Compressor Bottom Temp.
4	Condensing Coil Inlet Temp.
5	Condensing Coil Medium Temp.
6	Condensing Coil Outlet Temp.
7	EXV Opening Position
8	Modulation Percentage

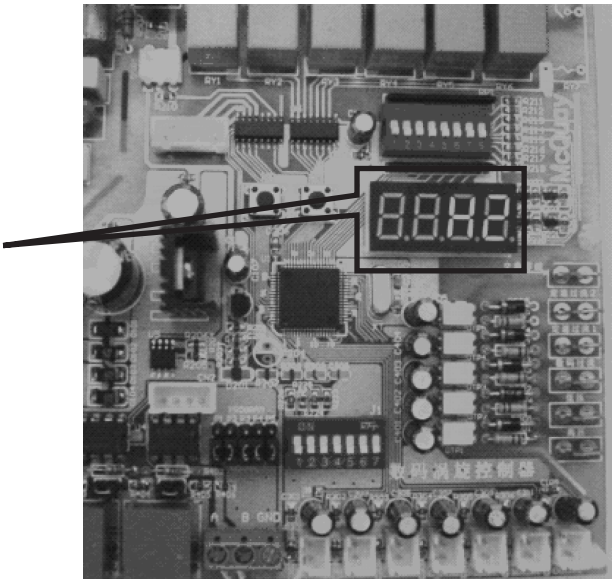


Figure 20 MDS A Series Data

Besides the dipswitches setting mention, there is also a field setting mode. It is important to know this field setting mode because the quantity of indoors of the MDS A series system needs to be set here. To enter into field setting mode, kindly follow the steps listed below:

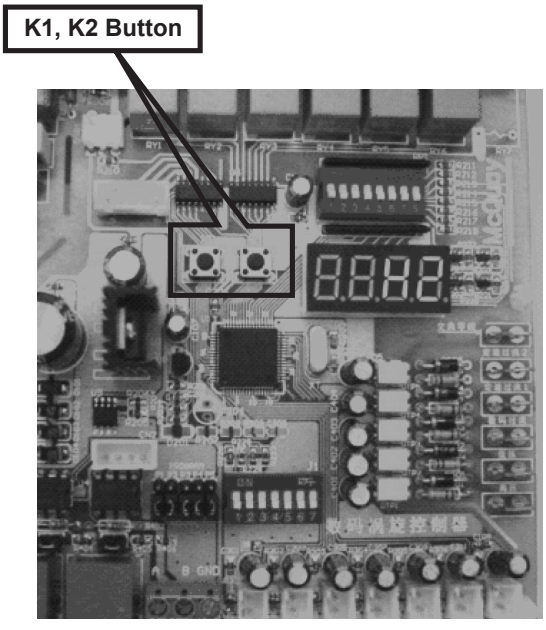


Figure 21 Location of K1 and K2

1. Power up the outdoor.
2. Press K2 for 5 second to enter parameter setting mode. The 7 segments LED display will show [- - - -].
3. You need to key in the password before you can make any changes. The password is 0755
4. Press K1 to select. Press K2 to confirm.
5. After it show [- - - -], press K1. It will show [- - - 0]. Press K2, it will show [- - 0-].
6. After that, press K1 to select “7” and K2 to confirm.
7. Once you successfully select “0755” and press K2, the PCB will enter setting mode.
8. The available setting to adjust are as follow:
   a. Indoor Quantity
   b. Temperature to initiate defrost checking
   c. Temperature to initiate defrost cycle
   d. Temperature to stop defrost cycle
   e. Interval of defrost cycle
   f. Duration of defrost cycle

   Most of the time, the only setting that need to do is the indoor quantity. Other data remain as factory default value.
9. If there is only 4 indoors in the system, please select “4” by pressing K1 until the LED show 4. Then press K2 to confirm.
10. Leave it for 5 seconds and the system will come out from the setting mode automatically.

(Please read first before you try on the PCB. If K1 or K2 is not press after 5 seconds, it will exit from the setting mode automatically)

MDS B Series

For MDS B series, there are total 3 set of dipswitches. These dipswitches are located on the upper layer of the PCB (same level with the 7 segment LED display)

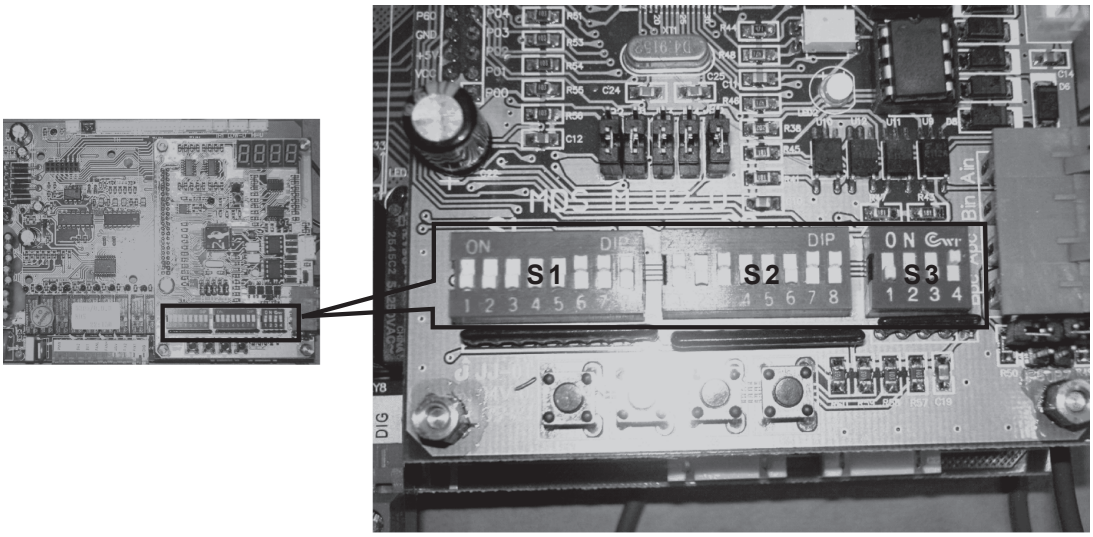


Figure 22 MDS B Series Outdoor PCB

Dipswitch S1

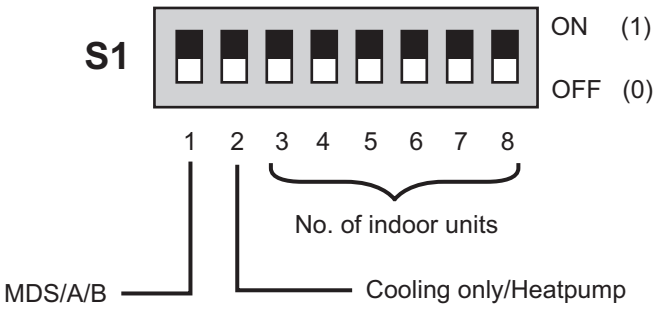


Figure 23 Dipswitch 1

For dipswitch 1, there are 3 functions. S1.1 is to determine whether the PCB is use in the MDS A series or a MDS B series. S1.2 is to determine whether the model is a cooling only model or heatpump model. Dipswitch S1.3-S1.8 are use to determine the quantity of indoors connected to the outdoor.

S1.1	MODEL
0	MDS-B Series
1	MDS-A Series
S1.2	**MODEL**
0	Heatpump
1	Cooling only

Figure 24 Dipswitch S1.1 & S1.2

S1.3	S1.4	S1.5	S1.6	S1.7	S1.8	Indoor Quantity
0	0	0	0	0	0	1
0	0	0	0	0	1	2
0	0	0	0	1	0	3
0	0	0	0	1	1	4
0	0	0	1	0	0	5
0	0	0	1	0	1	6
0	0	0	1	1	0	7
0	0	0	1	1	1	8
0	0	1	0	0	0	9
0	0	1	0	0	1	10
0	0	1	0	1	0	11
0	0	1	0	1	1	12
0	0	1	1	0	0	13
0	0	1	1	0	1	14
0	0	1	1	1	0	15
0	0	1	1	1	1	16
0	1	0	0	0	0	17
0	1	0	0	0	1	18
0	1	0	0	1	0	19
0	1	0	0	1	1	20
0	1	0	1	0	0	21
0	1	0	1	0	1	22
0	1	0	1	1	0	23
0	1	0	1	1	1	24

S1.3	S1.4	S1.5	S1.6	S1.7	S1.8	Indoor Quantity
0	1	1	0	0	0	25
0	1	1	0	0	1	26
0	1	1	0	1	0	27
0	1	1	0	1	1	28
0	1	1	1	0	0	29
0	1	1	1	0	1	30
0	1	1	1	1	0	31
0	1	1	1	1	1	32
1	0	0	0	0	0	33
1	0	0	0	0	1	34
1	0	0	0	1	0	35
1	0	0	0	1	1	36
1	0	0	1	0	0	37
1	0	0	1	0	1	38
1	0	0	1	1	0	39
1	0	0	1	1	1	40
1	0	1	0	0	0	41
1	0	1	0	0	1	42
1	0	1	0	1	0	43
1	0	1	0	1	1	44
1	0	1	1	0	0	45
1	0	1	1	0	1	46
1	0	1	1	1	0	47
1	0	1	1	1	1	48

Figure 25 Dipswitch S1.3 to S1.8

Dipswitch S2

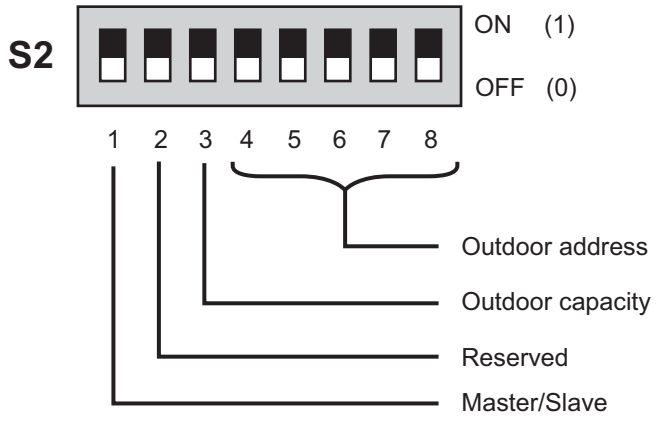


Figure 26 Dipswitch S2

For Dipswitch 2, the main function is to set the outdoor address if the outdoor is connected in a network of outdoors or Central Wired Controller (MC303) is used. Dipswitch S2.1 is to determine whether the outdoor is a single unit, master unit or salve unit. Dipswitch S2.3 is related to Dipswitch S3 which is use to determine the capacity of the outdoor. This will be cover in dipswitch S3.

S2.1	TYPE OF MODEL
0	Slave Module
1	Master Module

Figure 27 Dipswitch S2.1

The PCB will only be set to “0” or “OFF” when it is a slave unit. The setting should be “1” or “ON” when it is a single outdoor or a master unit.

S2.4	S2.5	S2.6	S2.7	S2.8	Outdoor Address
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	1	0	0	4
0	0	1	0	1	5
0	0	1	1	0	6
0	0	1	1	1	7
0	1	0	0	0	8
0	1	0	0	1	9
0	1	0	1	0	10
0	1	0	1	1	11
0	1	1	0	0	12
0	1	1	0	1	13
0	1	1	1	0	14
0	1	1	1	1	15

S2.4	S2.5	S2.6	S2.7	S2.8	Outdoor Address
1	0	0	0	0	16
1	0	0	0	1	17
1	0	0	1	0	18
1	0	0	1	1	19
1	0	1	0	0	20
1	0	1	0	1	21
1	0	1	1	0	22
1	0	1	1	1	23
1	1	0	0	0	24
1	1	0	0	1	25
1	1	0	1	0	26
1	1	0	1	1	27
1	1	1	0	0	28
1	1	1	0	1	29
1	1	1	1	0	30
1	1	1	1	1	31

Figure 28 Dipswitch S2.4 – S2.8

If the outdoor is not connected to the central control monitoring software (Smart Commander) or the Central Wired Controller (MC303), there is no need to set the address. If the outdoor is connected with these accessories, then the same rules on the indoor setting is applied here also. The rules are as follow:

i) Each outdoor number must be unique. The outdoor address cannot duplicate.
j) The first outdoor address must be 0. Do not start the first outdoor with address 1.
k) While setting the outdoor address, the outdoor address number cannot skip. For example, if there are only 4 outdoors in a system, the outdoor address needs to be 0, 1, 2 and 3.
l) It is advisable that the outdoor address follow the sequence of the communication wiring. For example, for a 4 outdoors in the system, the first outdoor after the gateway should have address 0, the next outdoor address should be 1 and the last outdoor of the communication wiring should be 3.

Dipswitch S3

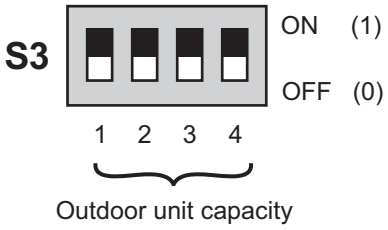


Figure 29 Dipswitch S3

For Dipswitch S3, the main function is to determine the MDS-B series outdoor capacity. Besides this dipswitch, dipswitch S2.3 is also interrelated. The setting of the capacity is as follow:

					Outdoor Capacity	
S2.3	S3.1	S3.2	S3.3	S3.4	MDS-A	MDS-B
0	0	0	0	0	3HP	8 HP
0	0	0	0	1	4HP	10 HP
0	0	0	1	0	5HP	12 HP
0	0	0	1	1	6HP	15 HP
0	0	1	0	0	8HP	18 HP
0	0	1	0	1	10HP	20 HP
0	0	1	1	0	-	22 HP
0	0	1	1	1	-	24 HP
0	1	0	0	0	-	26 HP
0	1	0	0	1	-	28 HP
0	1	0	1	0	-	30 HP
0	1	0	1	1	-	32 HP

					Outdoor Capacity	
S2.3	S3.1	S3.2	S3.3	S3.4	MDS-A	MDS-B
0	1	1	0	0	-	34 HP
0	1	1	0	1	-	36 HP
0	1	1	1	0	-	38 HP
0	1	1	1	1	-	40 HP
1	0	0	0	0	-	42 HP
1	0	0	0	1	-	44 HP
1	0	0	1	0	-	46 HP
1	0	0	1	1	-	48 HP
1	0	1	0	0	-	50 HP
1	0	1	0	1	-	14 HP
1	0	1	1	0	-	16 HP

Figure 30 Outdoor Unit Capacity Setting

Commissioning Software

Smart Commander is the MDS software use to perform commissioning and troubleshooting of MDS system. It is recommended that service personnel to use this software while commissioning MDS system. The hardware and software requirement for the software are as follow:

- Processor Speed 800MHz or above
- RAM 256M or above
- Hard Disk space 4G or above
- Operating System – Windows 2000 or XP only
- Serial Port and USB port is available
- Monitor screen size 15 inches or above

Inside the commissioning kit from the factory, it consist of a CD (with the commissioning Software, a dongle USB key, a gateway with power connection and a cable connected from the gateway to serial port. The Service Manual will have a more detail explanation on software function.

Figure 1 Content inside the Commissioning Kit

Set Up the Software

To set up the software, first is to install the driver for the USB dongle key. Once the drive is completed, install the Smart Commander Software. In the CD come together with the smart commander kit, there are 4 items.

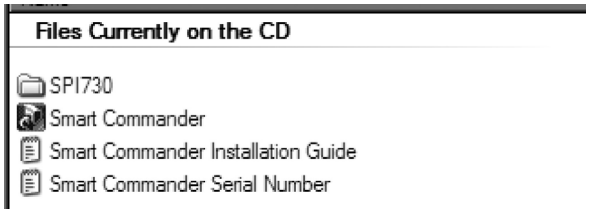


Figure 2 Content inside the CD

To set up the USB dongle drive, the user is required to initiate the setup file in the SPI730 folder.

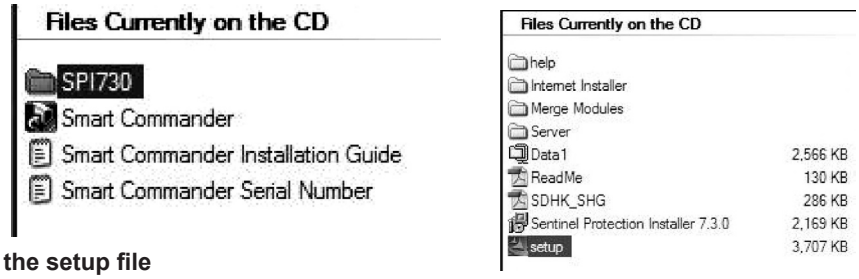


Figure 3 Initiate the setup file

After initiated the setup file, just follow through the instruction on the prompt up screen to install the driver. Once the driver installation is completed, the following screen will appeared.

Figure 1 Content inside the Commissioning Kit

After completion of the USB dongle driver installation, the user will need to install the Smart Commander Service version software. Inside the CD, beside that installation file “Smart Commander” there is also a file “Smart Commander Serial Number” which consists the serial number for the software.

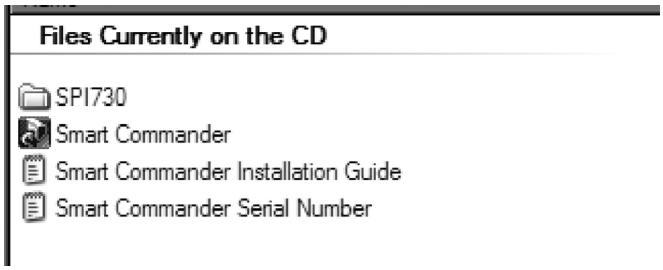


Figure 5 Content inside the CD

Upon initiating the Smart Commander installation file, please follow the instruction on the prompt up screen until you reach the following screen which required for serial number.

Figure 6 Request for Customer Information

Kindly use the serial number from the txt file inside the CD-Rom and key is the necessary information requested. Once completed, click on “Next” and follow the instruction on the prompt up screen. Once the software installation is completed, the prompt up screen will disappeared. In order to confirm whether the software is already installed or not, the user can checked it under the program location.

Figure 7 Smart Commander Installation is Completed

To start up the software, user will need to insert the USB dongle key into the PC. This USB key is crucial as every time the commissioning software is executed or in operation, the software will refer to this key. Only remove this after the commissioning software is closed.

Wiring Connection

The wiring connection from the gateway to the outdoor unit will be as follow:

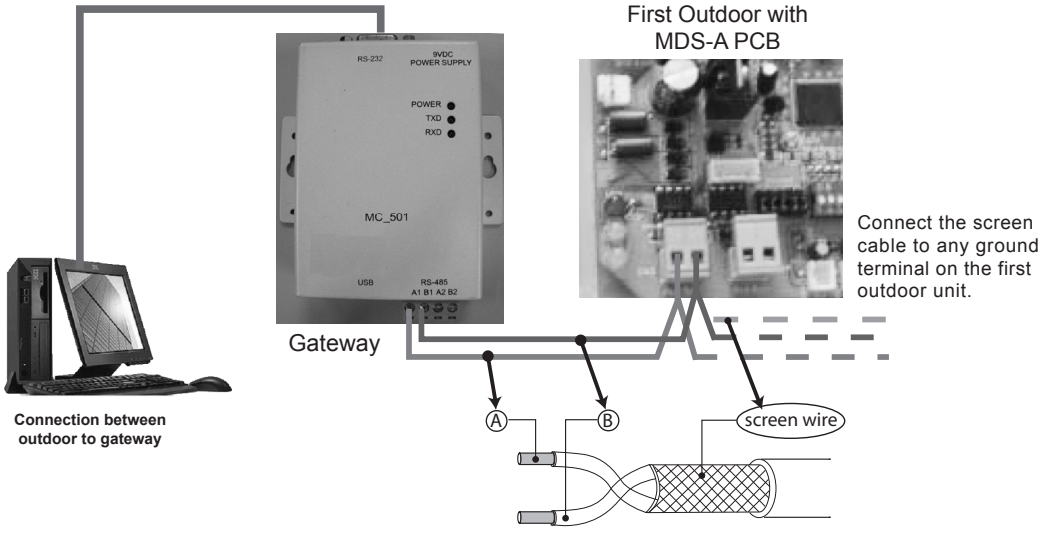


Figure 8 MDS A Series Outdoor Connections to Smart Commander Gateway

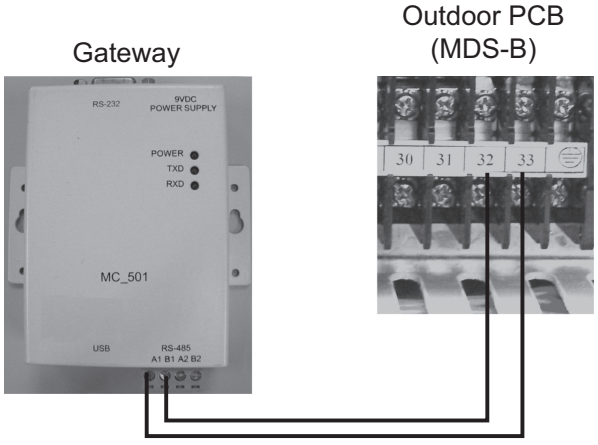


Figure 9 MDS B Series

For MDS B series, the connection will be directly from terminal to the gateway. A_{pc} connect to A1 and B_{pc} to B1. The A_{pc} and B_{pc} will vary base on the model and reference are as follow:

R-22 Model	Terminal Number for A_{pc}	Terminal Number for B_{pc}
MDS80/100/120/150/260/280/300/320B/BR	32	33
MDS180/200/220/240B/BR	47	48

R-410A Model	Terminal Number for A_{pc}	Terminal Number for B_{pc}
5MDS80/100/120/140/160/180/260/280/300/320/340/360B/BR	30	31
5MDS200/220/240/380/400/420/440/460/480/500B/BR	47	48

The next connection will be from the gateway to the serial port of the laptop or personal computer (PC). There are two ways of connection depends on the hardware of the PC. For PC with serial port available, the connection will be as follow:

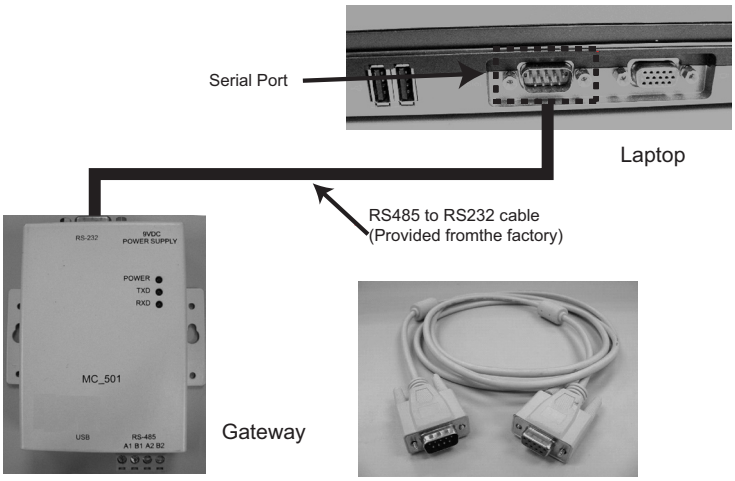


Figure 10 Gateway to Serial Port Connection

However, in the event of the PC does not have serial port, a RS232 (Serial Port) to USB converter cable can be use. The connection will be as follow:

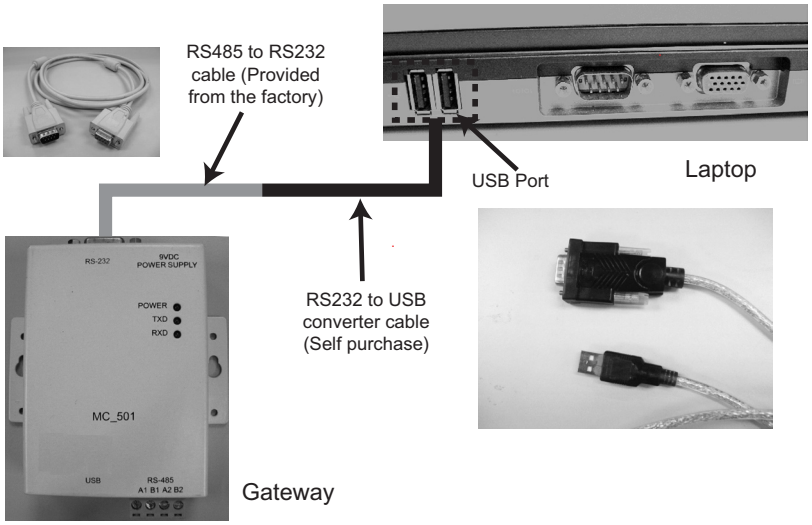


Figure 11 Gateway to USB Port Connection

When user purchased the RS232 to USB converter from any IT hardware outlets, it will come together with a CD which consist the driver. Kindly install the drive accordingly. (The interface will be different base on the supplier; hence this manual cannot give any guideline or any indication).

Once the driver is installed, the user will need to change the setting on the smart commander software to perform the connection. The steps will be quite complicated. Hence, kindly read through before try out on the PC. Step 1: Go to **"Start"** and select **"Control Panel"**

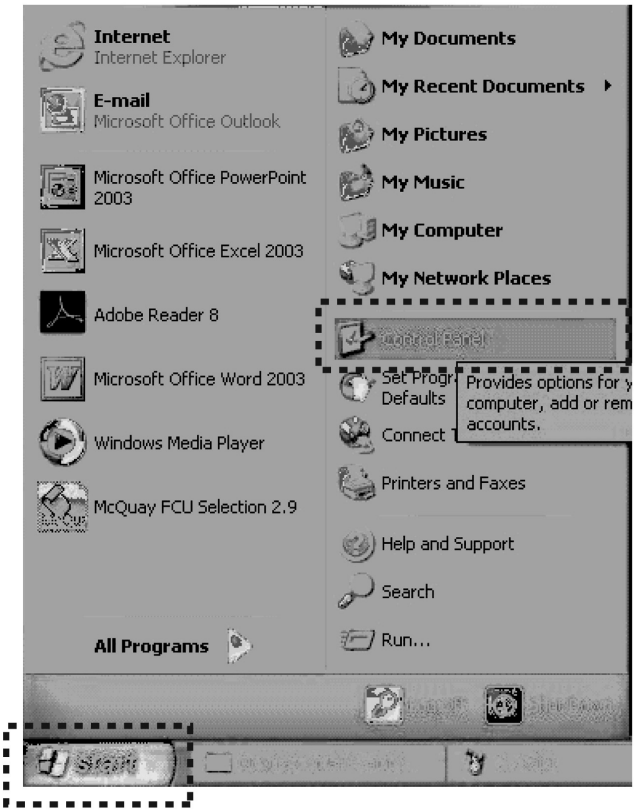


Figure 12 Start up Menu

After click on the Control Panel, a new window will prompt up. The manual show a lot of setting that can be done the PC. Please select **"System"**

Figure 13 Control Panel Selection Manual

Once the system icon is selected, another new screen will prompt up. Click on the **Hardware** on the tap manual. Once the window show the Hardware Manual, select **Device Manager**.

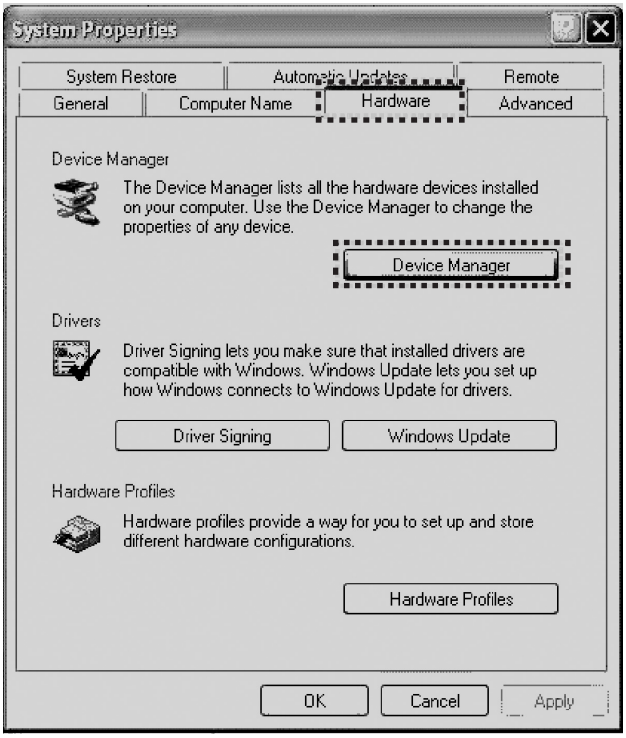


Figure 14 Hardware Manual

Again, another new window will prompt out. This screen show the list of hardware which is available in your PC. User will need to expand the **Port (COM & LPT)** to locate the communication port. From the example below, the **USB to RS232 or Serial Port is COM3**. Please note that the communication port (COM) on each laptop will be different. If the COM port goes more than 10, kindly contact your PC supplier to rectify the issue. Kindly close all prompt up windows once the COM port is confirmed.

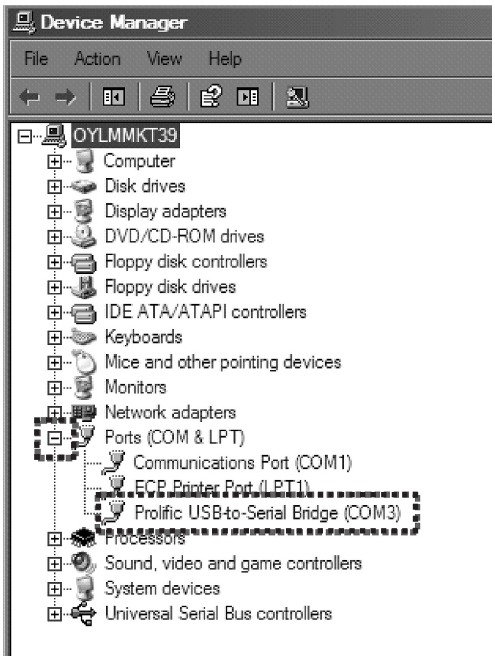


Figure 15 Device Manager

Once the COM port is confirmed, kindly initiate the Smart Commander Software. The change need to be done in the software itself. Once the software is finished initiated, the user will need to change the COM port setting. To do this, please go to down menu **Function(E)** and select "**Parameter Setting**"

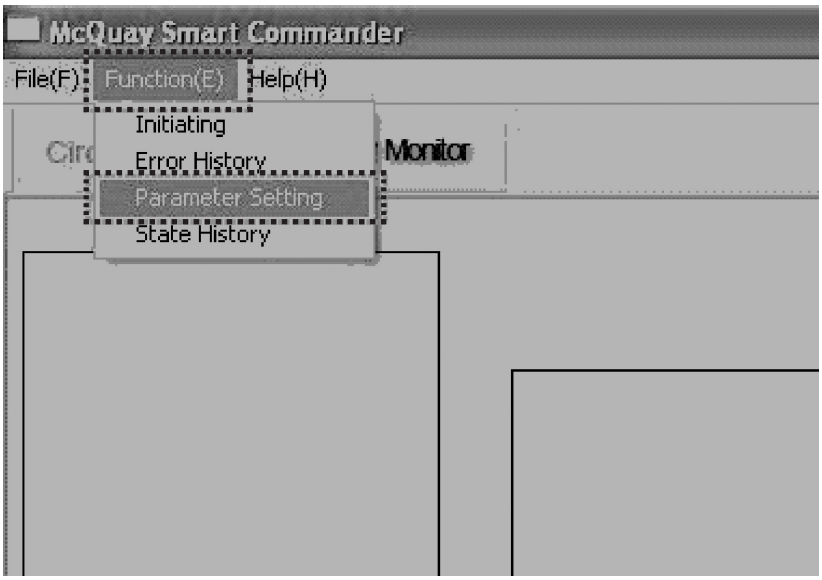


Figure 16 Smart Commander

A new window will prompt up. This is the parameter setting manual. To change the communication port, go to **I/O Port** and click on the down arrow. Base on the previous example, the **USB to RS232 or Serial Port is COM3**. Hence, please select "COM3". Then click **"OK"**. Please note that the communication port (COM) on each laptop will be different. If the COM port goes more than 10, kindly contact your PC supplier to rectify the issue.

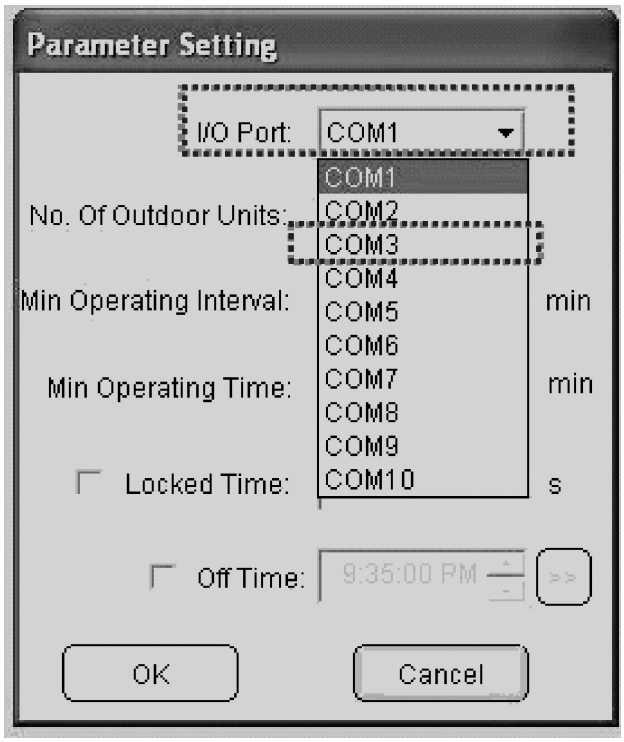


Figure 17 Parameter Setting Manual

After the setting of the COM port is completed, the user can connect to the system. Go to drop down menu Function (E) again and select Initiating to connect to the MDS system. Once the software is connected to the system, all available parameter of the system (Indoor and Outdoor) will be visible.

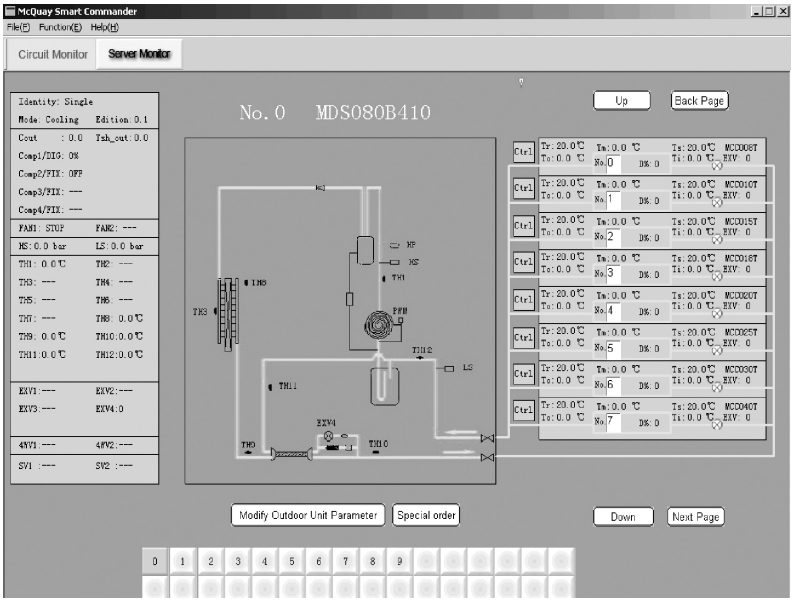


Figure 18 Smart Commander Connected to MDS System

Smart Commander User Manual

Smart Commander Service version had two different windows. The first window is named **Circuit Monitor**. User is allows to control and monitor the indoor and outdoor parameter under this windows. The **Server Monitor** window allows user to plot graph using the data already obtain when the Smart Commander is connected to the MDS system.

Circuit Monitor

Circuit monitor interface is used to monitor all parameter of indoor and outdoor which connected to monitor software.

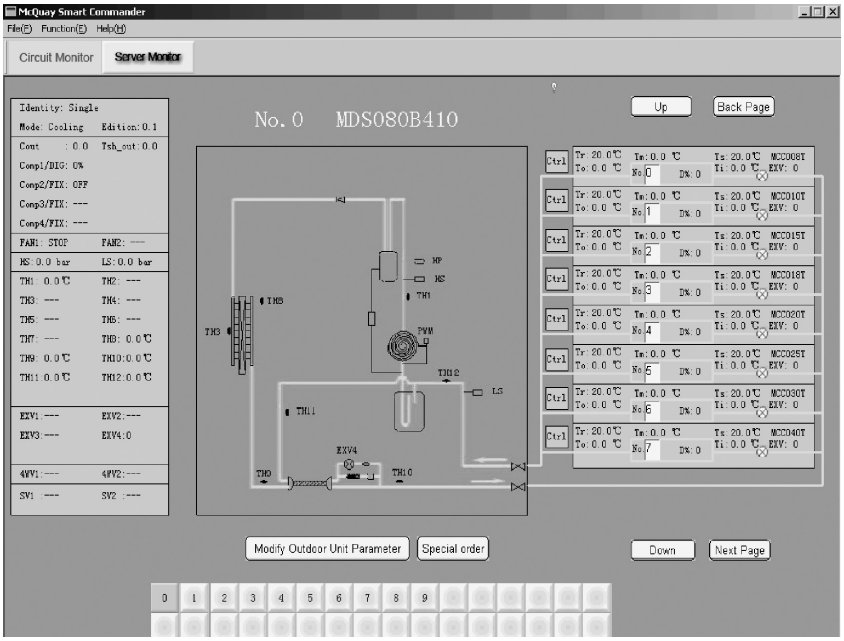


Figure 19 Circuit Monitor Window in Smart Commander

If the MDSs are connected in a network, User can observe all parameter of outdoor unit through the outdoor set address in the PCB. Once the outdoor is selected, the relevant outdoor unit number will be highlighted with a darker colour.

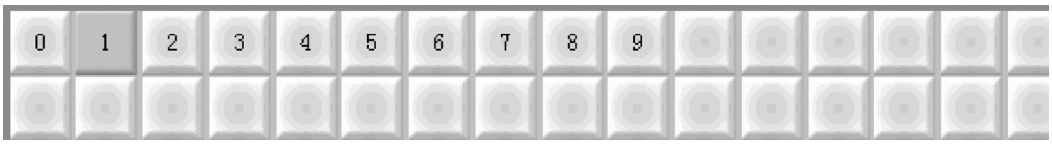


Figure 20 Outdoor Selection

There are four major parts in the Circuit Monitor window.

- Outdoor Unit Monitoring
- Outdoor Refrigerant Diagram
- Indoor Unit Control and Monitoring
- Outdoor Unit Parameter Modification

Outdoor Unit Monitoring

Item that can be monitor on an outdoor unit are as follow:

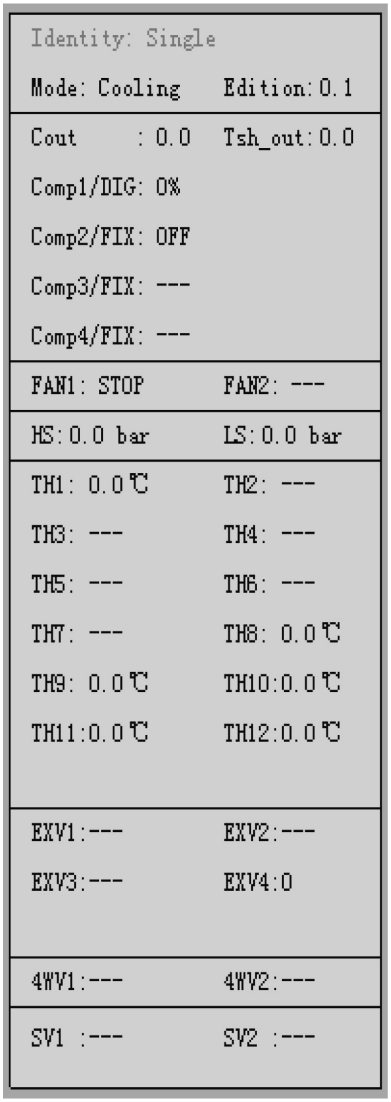


Figure 21 Outdoor Unit Monitoring

Item	Display
Identity	: Type of model: Single / Master / Slave
Mode	: Operating Mode: Cooling / Heating / Defrost
Edition	: The program version of the outdoor
C_{out}	: Outdoor Capacity (Unit: HP)
T_{sh_out}	: Outdoor unit superheat (Unit: °C)
Comp1/DIG	: Digital compressor output percentage (Unit: %)
Comp2/3/4/FIX	: Fixed compressor status. ON / OFF
FAN1/FAN2	: Outdoor fan status. STOP / LOW / HIGH
HS / LS	: High pressure and low pressure reading (Unit: Bar 1bar=0.1MPa 1bar=0.98kgf/cm^2)
TH	: Temperature sensor reading. (Unit: °C) • TH1: Compressor discharge • TH2: 1st Coil inlet • TH3: 1st Coil middle • TH4: 2nd Coil inlet • TH5: 2nd Coil middle • TH6: Entering water (Applicable for water source model only) • TH7: Heaving water (Applicable for water source model only) • TH8: Outdoor Ambient • TH9: Refrigerant temperature before sub-cool circuit • TH10: Refrigerant temperature after sub-cool circuit • TH11: Sub-cool refrigerant temperature after sub-cool circuit • TH12: Compressor suction
EXV1/2/3	: Electronic Expansion Valve Opening Steps. Fully close during cooling & defrost cycle. Only operate during heating cycle
EXV4	: Sub-cool circuit Electronic Expansion Valve. Operate during cooling cycle. Fully close during heating cycle
SV1/2	: By-pass valve. For future provision
If there model does not have the respective sensor, it will display "_ _" after the parameter item.	

Outdoor Refrigerant Diagram

This allows the user to understand the refrigerant circuit within the outdoor unit. The different colours on the refrigerant line indicate the type of mode the outdoor model is operating. It also shows the sensors location. This helps a lot if the user cannot remember the function of the sensor shows in the outdoor unit monitoring chart.

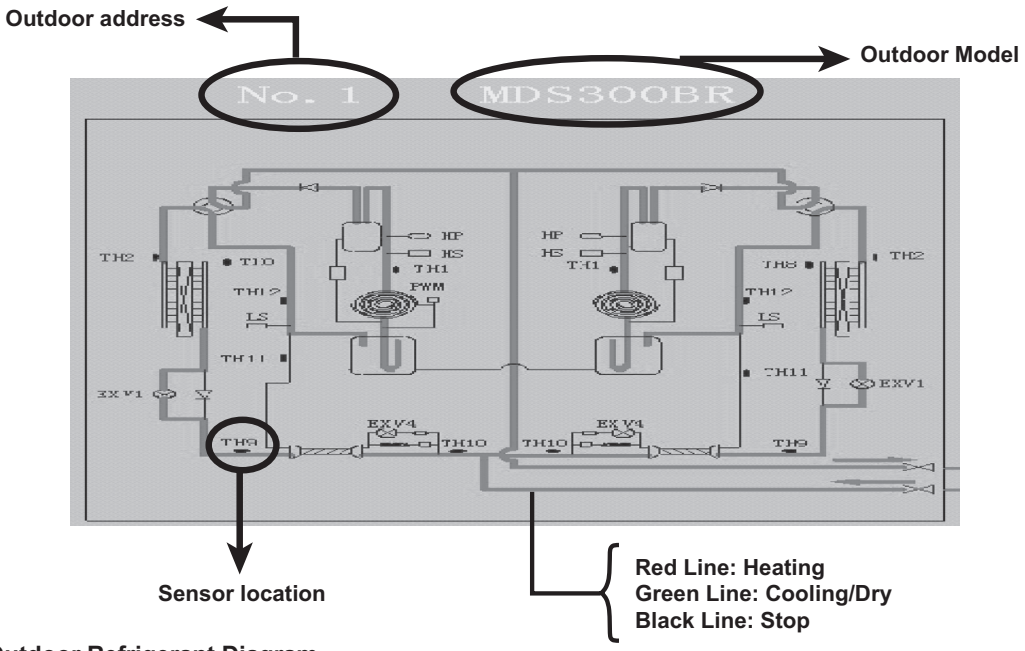


Figure 22 Outdoor Refrigerant Diagram

Indoor Unit Control and Monitoring

When using the Smart Commander, the user can activated the indoors via the software. This allows troubleshooting can be carried out easily without the needs to go to the indoor itself to turn it on. Besides that, a list of information on the indoor model is also visible.

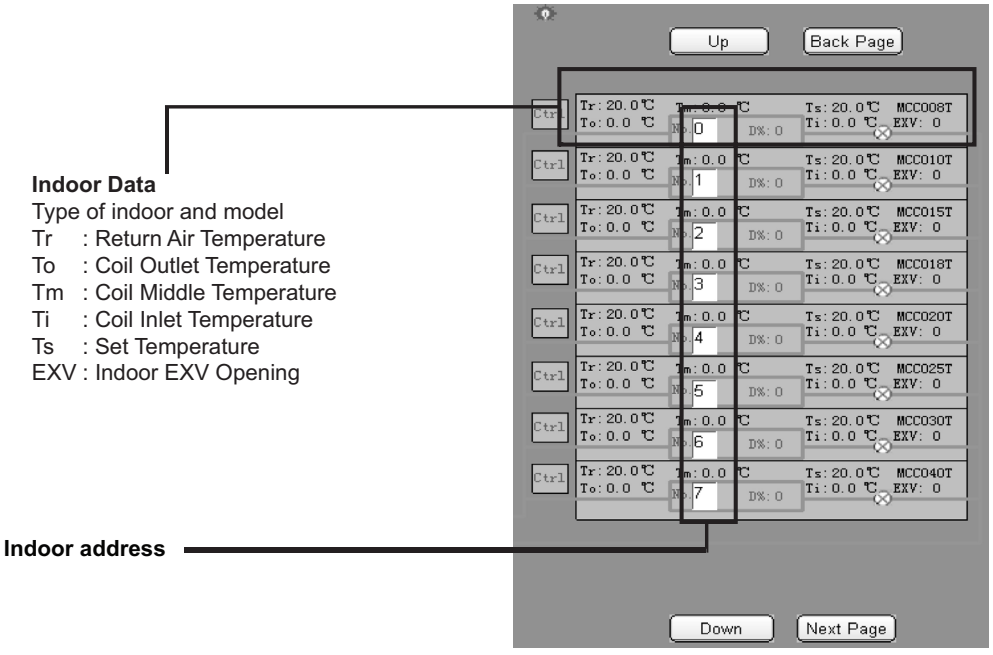
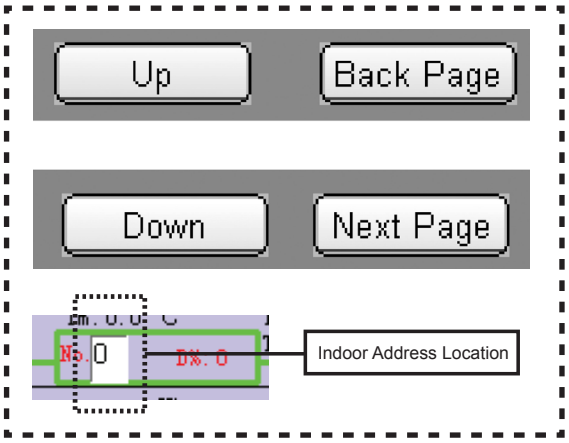


Figure 23 Indoor Unit Control and Monitoring



There are two ways to scroll to the unit if it is not shown in the screen. The first way is to click on the Up, Down, Back Page or Next Page button. By pressing on the Up / Down button, the indoor unit will ascend or descend accordingly. By clickling on the Back Page or Next Page button, the whole set indoors will be change.

The second way is to enter the indoor address number on the Indoor Address location. This will directly display the indoor the user selected to view.

Figure 24 Scroll to Specific Indoor Unit

To change the setting on the indoor, user will need click on the Ctrl button. After the button is click, a new window will prompt out.

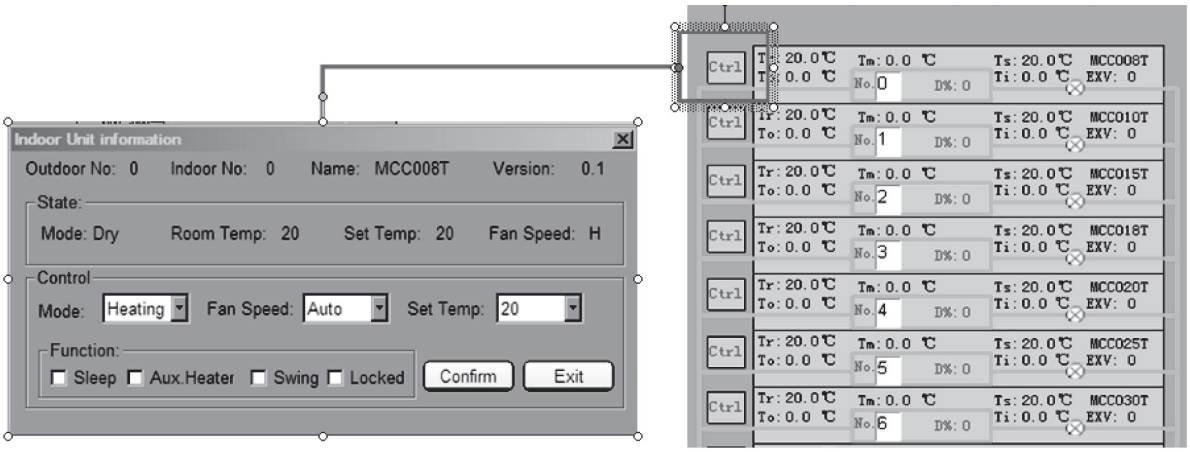


Figure 25 Indoor Unit Control Window

The Indoor Unit Control Window can be divided into 2 main sections Top portion is the **Information Portion** display and divided with unit information and unit operating status. The bottom portion of the screen is the **Control Portion**.

The top part of the Information Portion displays the information of the indoor.

Item		Display
Outdoor No	:	The outdoor address this particular indoor is connected to. If there is no outdoor address set, the default value will be 0.
Indoor No	:	The address set on the indoor. This will be base on the PCB setting.
Name	:	The indoor model and capacity. If the indoors use are from Malaysia factory, the capacity will be different. Please refer to Figure 26 Indoor Names Reference
Version	:	The Indoor program version

The bottom portion of the Information Portion displays the current setting and operating mode of the indoor unit.

Item		Display
Mode	:	Operating model of the indoor unit. Available mode: Stop / Cooling / Heating / Dry / Fan
Room Temp	:	Indoor room temperature (Unit: °C)
Set Temp	:	Indoor set temperature (Unit: °C)
Fan Speed	:	The operating fan speed. Available speed: High / Medium / Low

The Control Portion is also separated into 2 parts. The first part is to control the operating setting of the indoor unit.

Item	Display
Mode	: Operating model of the indoor unit. (Stop, Cooling, Heating, Dry, Fan)
Fan Speed	: The operating fan speed. Available speed: High / Medium / Low
Set Temp	: To set the required temperature of the indoor. (Unit: °C). Available range is from 16 °C to 30 °C

The last portion is the function setting of the unit.

Item	Display
Sleep Mode	: Indoor unit to operate in sleep mode.
Auxiliary Heater	: To activate additional heater. Currently the option is not available.
Swing	: Not applicable for conceal / ducted mode
Locked	: To forbidden the usage of handset during commissioning & troubleshooting. Once reset when the indoor power is turned off.

	Dipswitch Setting (Capacity)					
OYLM Indoor Model	S3.1	S3.2	S3.3	S3.4	S3.5	Troubleshooting Software Display
CCD10C	1	0	1	1	0	MCC011T
CCD15C	0	0	1	0	0	MCC015T
CCD20C	0	1	0	0	0	MCC020T
CCD25C	0	1	0	1	0	MCC025T
CCD28C	1	1	0	1	0	MCC032T
CCD30C	1	1	1	0	0	MCC035T
CCD38C	0	1	1	1	0	MCC040T
CCD40C	1	1	1	1	0	MCC045T
CCD50C	1	0	0	1	0	MCC060T
CCD60C	0	1	0	1	1	MCC065T
WMD09G	0	0	0	1	0	MWM010T
WMD10G	1	0	1	1	0	MWM011T
WMD15G	0	0	1	0	0	MWM015T
WMD20G	0	1	0	0	0	MWM020T
WMD25G	0	1	0	1	0	MWM025T
CKD10C	1	0	1	1	0	MCK011T
CKD15C	0	0	1	0	0	MCK015T
CKD20C / 20A	0	1	0	0	0	MCK020T
CKD25A	0	1	0	1	0	MCK025T
CKD30A	1	1	1	0	0	MCK035T
CKD40A	1	1	1	1	0	MCK045T
CKD50A	1	0	0	1	0	MCK060T
CED15E	0	0	1	0	0	MCM015T
CED20E	0	1	0	0	0	MCM020T
CED25E	0	1	0	1	0	MCM025T
CED28E	1	1	0	1	0	MCM032T
CED40D	1	1	1	1	0	MCM045T
CED50D	1	0	0	1	0	MCM060T
CED62C	0	1	0	1	1	MCM065T
MDBD080	0	0	0	0	1	MDB080T
MDBD100	0	0	0	1	1	MDB100T

Figure 26 Indoor Name Reference

Outdoor Unit Parameter Modification

For the outdoor Unit Parameter Modification option, it is advisable not to change any data unless under the instruction from the factory side. The default value set had been decided after numerous testing conducted by R&D and should be suitable for most condition.

Figure 27 Button to access the Outdoor Unit Parameter Modification Window

In order to change any outdoor parameter, the user need click on the Modify Outdoor Unit Parameter button, a new window will prompt out.

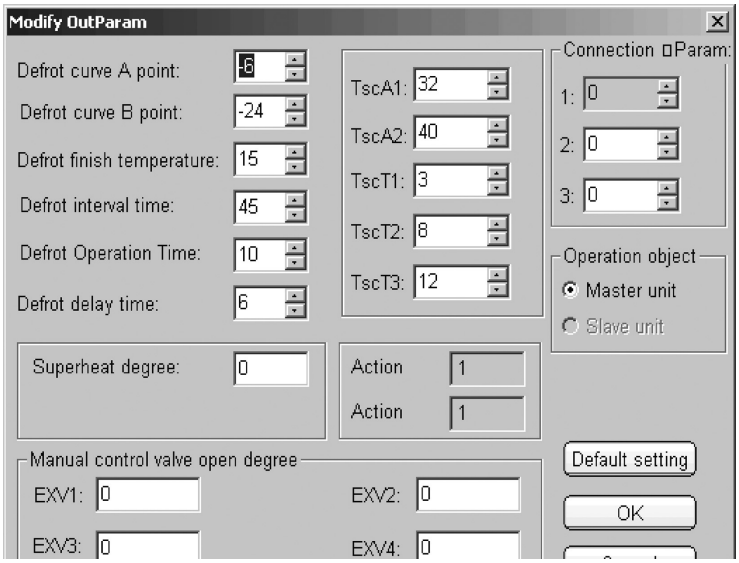


Figure 28 Outdoor Unit Parameter Modification Window

Defrost curve A, B point is used to define defrost area. For the defrost curve A point, the outdoor ambient is set at 6 ° C. User is only allow to change the suction temperature. The allowable range is from -2 ° C to -15 ° C). Default value is -6 ° C.

For the defrost curve B point, the outdoor ambient is set at -15 ° C. User is only allow to change the suction temperature. The allowable range is from -30 ° C to -15 ° C. Default value is -24 ° C

If the value is smaller, the defrost area (shared green) will become smaller. This means that is harder for the system to enter the defrost cycle. After the system had enter the defrost cycle, the system will come out faster from the defrost cycle.

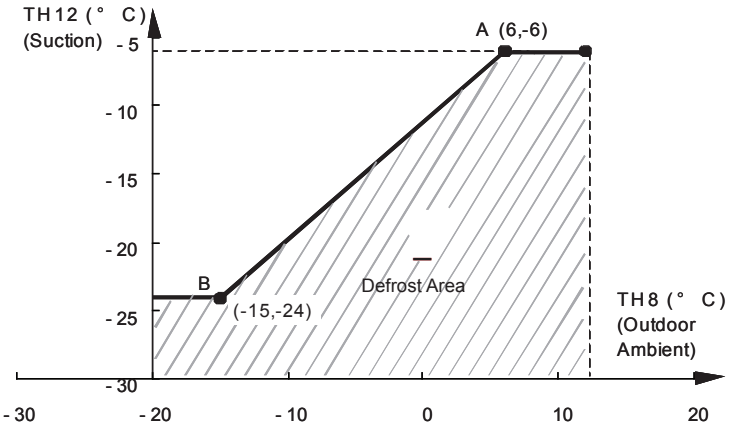


Figure 29 Defrost Area Definition

Defrost Finish Temperature
The defrost cycle will stop once TH9 exceed this set point. The lower the temperature, the faster the defrost cycle will end. The allowable range is from 10 deg C to 50 deg C.

- Default value for MDS80-240 is 15 deg C.
- Default value for MDS260-500 is 18 deg C.

Defrost Interval Time
The interval time between defrost cycle. The smaller the value, the shorter time between the defrost cycle. The allowable range is from 25 minutes to 90 minutes. Default value is 45 minutes.

Defrost Operation Time
The duration of the defrost cycle. The smaller the value, the short the defrost duration. The allowable range is from 5 minutes to 15 minutes. Default value is 10 minutes.

Defrost Delay Time
This option is for future provision. Currently is not available.

Sub-Cool Circuit Parameter
The next parameter is TscA1, TscA2, TscT1, TscT2, TscT3 which located inside a same box. These 5 setting is use to change the sub-cool circuit, which is only available in the MDS-B series outdoor.

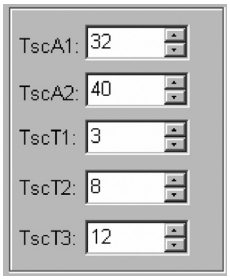
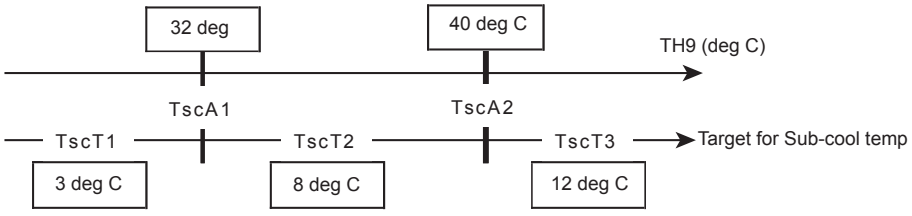


Figure 31 Sub-Cool Circuit Parameter

The main mechanism controlling the sub-cool circuit is the EXV 4. TscA1 & TscA2 is the reference temperature for TH9, which is the refrigerant temperature before sub-cool circuit. TscT1, TscT2 & TscT3 is the target Sub-cool target temperature the system needs to achieve. The actual sub-cool temperature will be base on TH9-TH10.

Example (with default value)



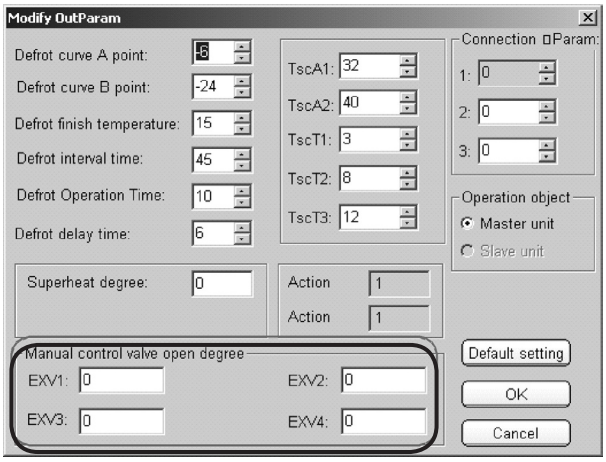
As the coil leaving temperature increase, the system will increase the sub-cool temperature for better performance and long piping application.

Figure 32 Sub-Cool Circuit Control Chart

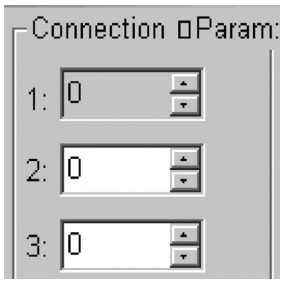
Superheat degree is the parameter for controlling outdoor superheat (EXV 1). This option is only applicable for heatpump model and EXV 1 is only used during heating cycle. The EXV 1 will open to achieve the target set here. Default value will be 5 deg c for R22 and 3 deg c for R410A model.

Outdoor super heat (Tsh) = T12 (Suction Temp) – Te (Saturation temperature)

Other Available Setting



This is to manually control the opening of the EXV. It is only applicable for MDS B series outdoor. EXV1/2/3 is only use during heating cycle. It remains shut during cooling or defrosts cycle. These EXV will not be available in cooling only model. EXV 4 is only use during cooling cycle and remains shut during heating cycle.



Item 1:
For future provision. Not applicable.

Item 2:
Compensation for long piping application. Default setting is 10. Setting range from 10 to 50. To increase capacity of outdoor during low load condition (only a few indoors are turned ON)
Example:
Setting at 15. The indoor capacity will be multiply by 1.5 times. When the piping is long, the outdoor will increase the output capacity to match the losses along the piping to ensure the indoor received the sufficient capacity.

Item 3:
Compensation for heating cycle. Default value is 37 Deg C. If indoor coil middle temperature is too low, outdoor will increase capacity to achieve the set value.

Beside the Modify Outdoor Unit Parameter, there is another button called Special Order. Once the button is selected, a new window will prompt.

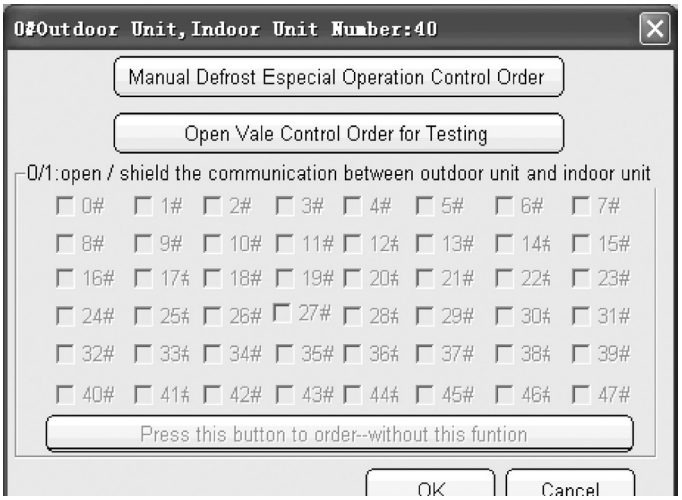


Figure 33 Special Order Manual

Manual defrost special operation control order is only applicable for heatpump model and can be activated during heating cycle. Once the button is selected, the outdoor will automatically go into defrost cycle. The duration for the defrost cycle will be 10 minutes.

Open valve control order when testing is useful during commissioning. Once this button is selected, all EXV will open to fully (480 steps). This function is only valid for B model. To resume normal operation, just press on the reset button located on the MDS B Series Outdoor PCB.

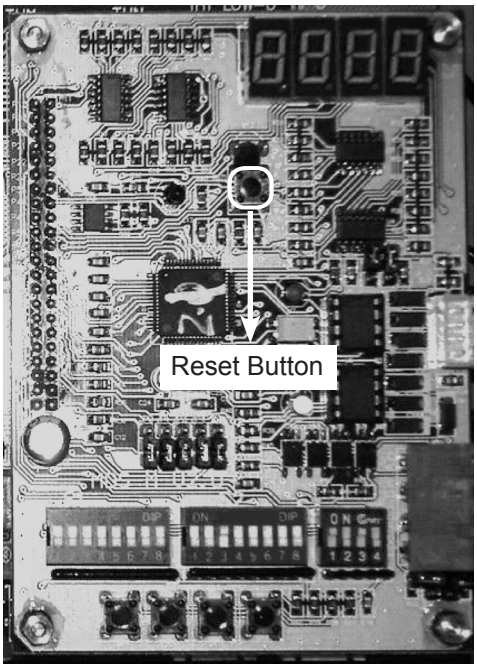


Figure 34 Reset Button on MDS B Series Outdoor PCB

Service Monitor

Service monitor interface is used to plot graph by using the MDS system parameter. By view on the graph, it will provide observation on the system operation condition. Total 5 parameters (outdoor or indoors) can be selected

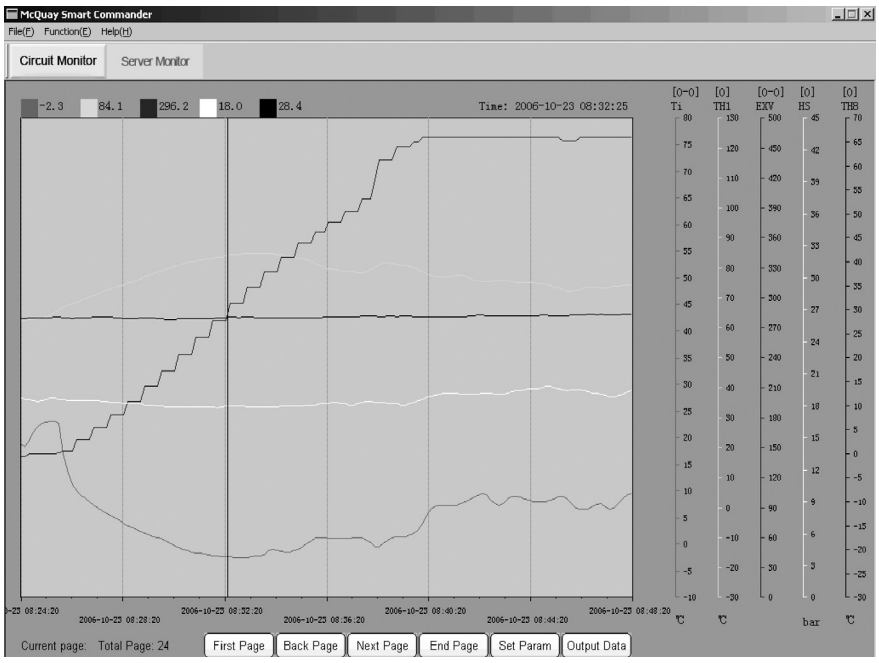


Figure 35 Service Monitor Window

There are totally 6 function button on the Service Monitor. The function of the button are as follow:
First page : Proceed to the first page of the graph
Back page : Proceed to the previous page
Next page : Proceed to next page
End page : Proceed to the last page

Figure 36 Function Button

By clicking on the Set Parameter button, a new window will prompt out, allowing user to determine which parameter to plot.

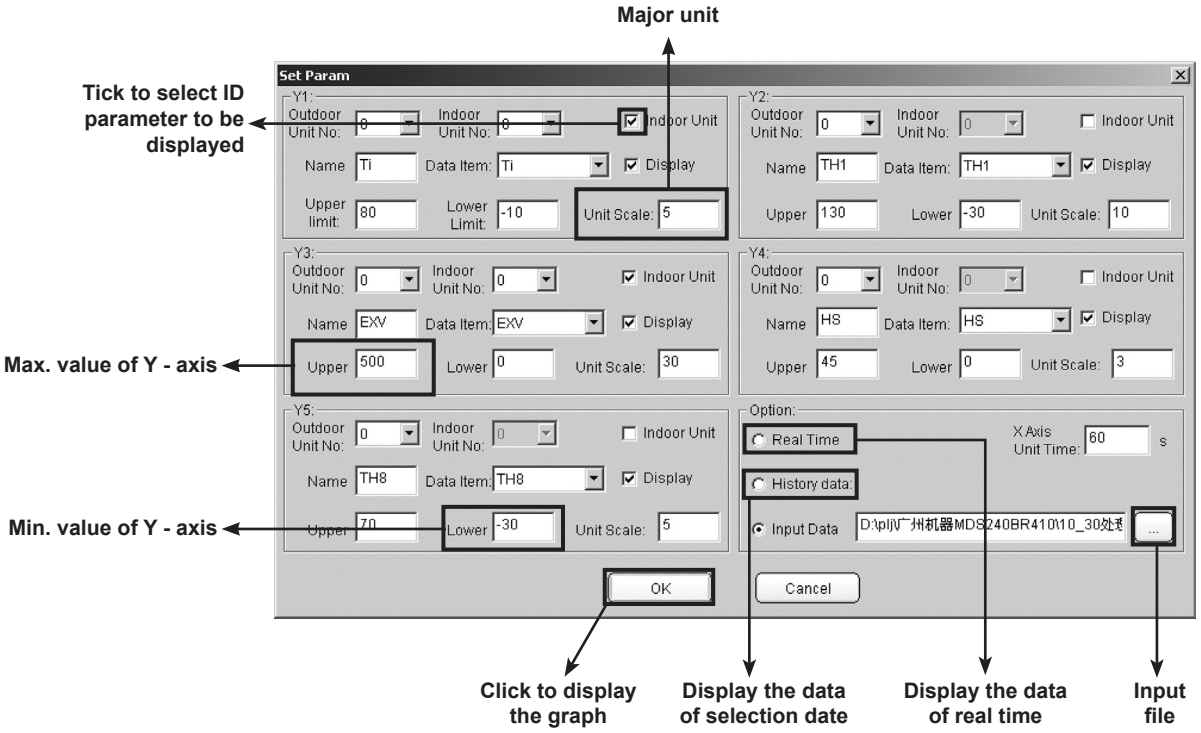


Figure 37 Parameter Selection Screen

This option allowed user to extract the data out and send back to the factory for analysis. The file generated will be with the extension *.top.
Example:
After the user had connected the Smart Commander to the system for sometime but still unable to track the cause. The user can then use this function to output the data in a compressed form. After that, user just need to send this file (with extension *.top) to the factory side. The factory service personnel will use the input data function mention in Figure 37 to extract the data and analyze.

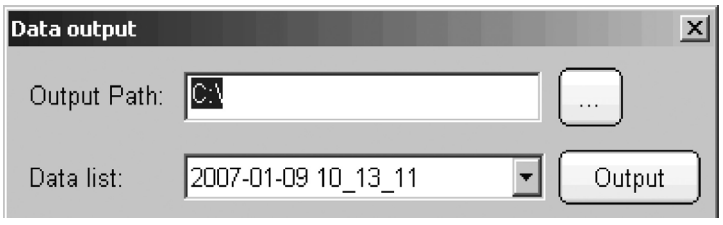


Figure 38 Data Output Window

Additional Refrigerant Charge

Event the MDS outdoor unit is pre-charge with refrigerant from the factory, but additional refrigerant is still required. This is because the pre-charge of refrigerant from the factory may not be sufficient to ensure the whole system work according to design condition due to different piping length.

There are two ways to know the required additional refrigerant. The 1st method is to use the data obtain while designing the system with the selection software. The 2nd method is to calculate the total piping length with respective piping diameter (liquid size) to determine the additional refrigerant.

Report from Selection Software
After using the Selection Software to choose the appropriate model and piping layout, user is allowed to generate the information into a form a report. From the report itself, the proposed additional amount of refrigerant required are stated in the report.

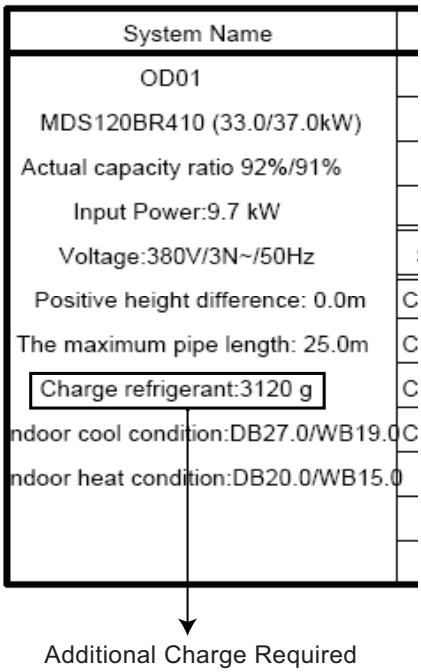


Figure 39 Additional Refrigerant Charge Proposed in the Report

Calculation Method
The second method is to calculate the additional refrigerant charge base on piping length and diameter. To use this method, the user is required to get the whole piping schematic diagram. After that, user will need to know the exact pipe length and their respective diameter. Then, user will need to sum up the piping length used on the liquid pipe only base on different diameter. Once the piping length of different diameter is obtained, apply the length into the formula below to calculate additional refrigerant required.

Additional charge amount:
= ∑ Li* Gi
= (Piping Length for 15.88mm X Refrigerant Charge Amount)
+ (Piping Length for 12.7mm X Refrigerant Charge Amount)
+ (Piping Length for 9.52mm X Refrigerant Charge Amount)
+ (Piping Length for 6.35mm X Refrigerant Charge Amount)

Caution that, the refrigerant charge amount of different pipe diameter varies base on type of refrigerant.

Pipe Diameter (mm)	6.35	9.52	12.70	15.88	19.05
R-22 Additional Charge (g/m)	50	80	120	180	290

Figure 40 Additional Charge Reference for R22

Pipe Diameter (mm)	6.35	9.52	12.70	15.88	19.05
R-410A Additional Charge (g/m)	45	70	120	180	260

Figure 41 Additional Charge Reference for R410A

Which ever method user used to determine the additional refrigerant, it is recommended to monitor the parameter of the outdoor model to ensure that the unit is working properly. The calculation done is only served as a guideline.

Outdoor Parameter Reference

After the commissioning personnel added in the additional refrigerant, it is advisable that they monitor the outdoor parameter. In order to guide the commissioning personnel, the factory side had provided a set of reference outdoor parameter for reference. All together, there are 3 set of reference data provided (3 sets for cooling cycle and 3 sets for heating cycle).

These data will serve as a guide on the possible operating condition of the unit. Once the outdoor parameter reach or close to the propose data, the charging of the refrigerant can be stop. The commissioning personnel will need to continue to monitor the outdoor parameter for sometime (1/2 to 1 hour). If the outdoor parameters remain constant or very small movement, the commissioning can be concluded.

For details, kindly refer to the following Appendix for the required model.

- Appendix I - R-22 MDS A Series Cooling Cycle Reference
- Appendix II - R-22 MDS B Series Cooling Cycle Reference
- Appendix III - R-22 MDS A Series Heating Cycle Reference
- Appendix IV -R-22 MDS B Series Heating Cycle Reference
- Appendix V -R-410A MDS B Series Cooling Cycle Reference
- Appendix VI - R-410A MDS B Series Heating Cycle Reference

Error Code

The MDS system is equipment with a list of error code to help user to trouble shoot if any system error occurs. The error code can be separated into indoor error code and outdoor error code.

Outdoor Error Code

Similarly, the error code for outdoor is differential by version of the MDS outdoor. MDS outdoor A series has a list of error code and MDS outdoor B had another list of list of error code.

MDS Outdoor A Series Error Code

The error code is shown on the outdoor PCB. There is four 7 segment LED on the top right corner of the PCB.

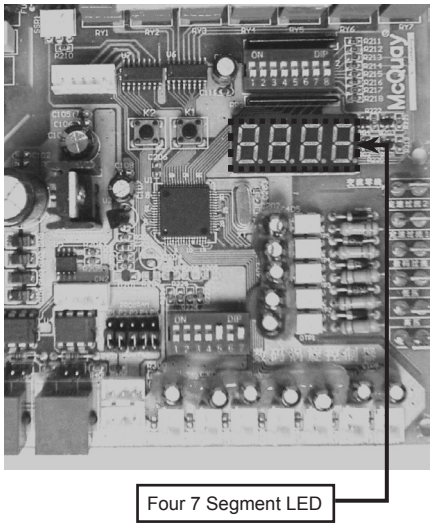


Figure 1 MDS Outdoor A Series PCB

ITEM	CODE	DESCRIPTION
1	**E0**	Discharge temperature sensor mulfunction
2	**E1**	Outdoor ambient temperature sensor mulfunction
3	**E2**	Suction temperature sensor mulfunction
4	**E3**	Compressor base temperature sensor mulfunction
5	**E4**	Coil inlet temperature sensor mulfunction
6	**E5**	Coil middle temperature sensor mulfunction
7	**E6**	Coil inlet temperature sensor mulfunction
8	**E7**	Compressor discharge temperature too high >130 deg C
9	**E8**	General System failure
10	**H1**	High pressure trip
11	**H2**	Digital scroll compressor overload
12	**H3**	Fixed scroll compressor overload
13	**L1**	Low pressure trip
14	**C-**	Communication failure between outdoor and all indoors
15	**CX**	“X” indoor no. Particular indoor no communication

Figure 2 MDS Outdoor A Series Error Code

From Figure 2, Item 15, the letter “X” indicate which indoor has communication problem.

Example 1:
Situation: Indoor number 1 is having communication error.
Observation: The LED display will show “C0”. “0” representing Indoor number 1.

Example 2:
Situation: Indoor number 8 is having communication error
Observation: The LED display will show “C7”. “7” representing Indoor number 8.

Please take note that for MDS A series, the maximum connectable indoors is only 16 units.

MDS Outdoor B Series Error Code

The error code is shown on the outdoor PCB. There is four 7 segment LED on the top right corner of the PCB.

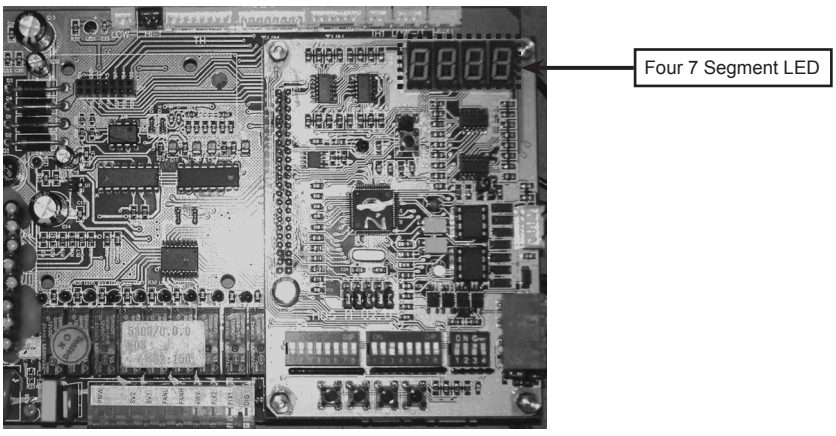


Figure 3 MDS Outdoor B Series PCB

Code	Denotation	Code	Denotation	Code	Denotation
	0/O		8		H
	1		9		L
	2		A		N
	3		B		P
	4		C		R
	5/S		D		T
	6		E		U
	7		F		Y

Figure 4 MDS Outdoor B Series Character Reference Table

ITEM	CODE	DESCRIPTION
0	**EC00**	00# indoor unit Communication failure
1	**EC01**	01# indoor unit Communication failure
2~47	**....**	02~47#indoor unit Communication failure
48	**ER48**	Digital compressor Overload
49	**ER49**	Fix 1 compressor Overload
50	**ER50**	Fix 2 compressor Overload
51	**ER51**	Fix 3 compressor Overload
52	**ER52**	Discharge pressure is too high
53	**ER53**	Suction pressure is too low
54	**ER54**	Outdoor unit's IC Error
55	**ER55**	System Error
56	**ER56**	Discharge temperature is too high
57	**ER57**	-
58	**ER58**	4 way valve failure
59	**ER59**	Ambient temperature is beyond the limit
60	**ER60**	Emergency Runing
61	**ER61**	Subheating is beyond the limit

ITEM	CODE	DESCRIPTION
62	**EC62**	Refrigerant released
63	**EC63**	Slaver outdoor unit Communication failure
64	**ER64**	TH1 temperature sensor failure
65	**ER65**	TH2 temperature sensor failure
66	**ER66**	TH3 temperature sensor failure
67	**ER67**	TH4 temperature sensor failure
68	**ER68**	TH5 temperature sensor failure
69	**ER69**	TH6 temperature sensor failure
70	**ER70**	TH7 temperature sensor failure
71	**ER71**	TH8 temperature sensor failure
72	**ER72**	TH9 temperature sensor failure
73	**ER73**	TH10 temperature sensor failure
74	**ER74**	TH11 temperature sensor failure
75	**ER75**	TH12 temperature sensor failure
76	**ER76**	Discharge pressure sensor failure
77	**ER77**	Suction pressure sensor failure
78	**ER78**	All indoor units Communication failure

Figure 5: MDS Outdoor B Series Error Code

From Figure 5, Item 0-47, the last two characters indicate which indoor has communication problem.

Example 1:
Situation: Indoor number 1 is having communication error
Observation: The LED display will show "EC00". "00" representing Indoor number 1.

Example 2:
Situation: Indoor number 21 is having communication error
Observation: The LED display will show "EC20". "20" representing Indoor number 21.

Please take note that for MDS B series, the maximum connectable indoors is only 48 units.

Indoor Error Code

For indoor error code, it will depend on type of indoor used. For decorative type indoor like wall mounted, ceiling cassette and ceiling convertible, the error code will be display via the blinking of the LED. For concealed type model, the unit will be using wired controller (MC301). For this controller, it will display the indoor error code as well as the outdoor error code.

ITEM	Type	Heat	Sleep/Fan	Dry
1	Indoor sensor error	●	●	◉
2	Indoor pump error	●	◉	●
3	Communication error	◉	●	●
4	Outdoor sensor error	●	◉	◉
5	Compressor overload	◉	◉	●
6	Pressure switch trip	◉	●	◉
7	Pressure sensor error	◉	◉	○
8	System failure	◉	◉	◉
9	Others	◉	○	○

○ LED ON
● LED OFF
◉ LED BLINK

Figure 6 MDS Indoor Error Code – LED Blinking

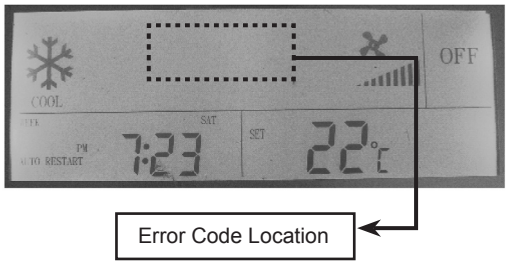


Figure 7 MDS Indoor Error Code – Error Code Location on Wired Controller (MC301)

ITEM	CODE	DESCRIPTION
1	**E0**	System malfunction
2	**E1**	Sensor broken (TH1 discharge temp.)
3	**E2**	Sensor broken (TH2 inlet coil 1#)
4	**E3**	Sensor broken (TH3 mid coil 1#)
5	**E4**	Sensor broken (TH4 inlet coil 2#)
6	**E5**	Sensor broken (TH5 mid coil 2#)
7	**E6**	Sensor broken (TH6 inlet coil 3#)
8	**E7**	Sensor broken (TH7 mid coil 3#)
9	**E8**	Sensor broken (TH8 ambient temp)
10	**E9**	Sensor broken (TH9 outlet coil)
11	**EA**	Sensor broken (TH10subcool outlet)
12	**EB**	Sensor broken(TH11subcool suction)
13	**EC**	Sensor broken (TH12 suction)
14	**EF**	Emergency run
15	**F0**	Outdoor storage malfunction
16	**F1**	Sensor broken (indoor inlet coil)
17	**F2**	Sensor broken (indoor mid coil)
18	**F3**	Sensor broken (indoor outlet coil)
19	**F4**	Sensor broken (indoor return air)
20	**F5**	Sensor broken (indoor supply air)
21	**F6**	Indoor and controller communication malfunction
22	**F7**	Ambient temp exceed the limit

ITEM	CODE	DESCRIPTION
23	**F8**	4wv malfunction
24	**F9**	Refrigerant leakage
25	**FA**	Controller storage malfunction
26	**FB**	Water pump(indoor drain pump)
27	**FC**	Indoor and outdoor communication malfunction
28	**FE**	Outdoor master and slave communication malfunction
29	**H0**	Digital comp overload
30	**H1**	Fixed comp1 overload
31	**H2**	Fixed comp2 overload
32	**H3**	Fixed comp3 overload
33	**H4**	High pressure too high
34	**H5**	Sensor broken, high pressure
35	**H6**	Discharge temp too high
36	**L0**	Super heat too low
37	**L1**	Low pressure too low
38	**L2**	Sensor broken, low pressure
39	**10**	System malfunction
40	**11**	Sensor broken(slaveTH1 discharge temp)
41	**12**	Sensor broken(slaveTH2 inlet coil 1#)
42	**13**	Sensor broken(slaveTH3 mid coil 1#)
43	**14**	Sensor broken(slaveTH4 inlet coil 2#)
44	**15**	Sensor broken(slaveTH5 mid coil 2#)

ITEM	CODE	DESCRIPTION
45	**16**	Sensor broken(slaveTH6 inlet coil 3#)
46	**17**	Sensor broken(slaveTH7 mid coil 3#)
47	**18**	Sensor broken(slaveTH8 ambient temp)
48	**19**	Sensor broken(slaveTH9 outlet coil)
49	**1A**	Sensor broken(slaveTH10subcool outlet)
50	**1B**	Sensor broken (slave TH11 subcool suction)
51	**1C**	Sensor broken(slaveTH12 suction)
52	**1F**	Emergency run(slave)
53	**20**	Outdoor storage malfunction(slave)
54	**27**	Ambient temp exceed the limit(slave)
55	**28**	4wv malfunction(slave)
56	**29**	Refrigerant leakage(slave)
57	**30**	Digital comp overload(slave)
58	**31**	Fixed comp1overload(slave)
59	**32**	Fixed comp2 overload(slave)
60	**33**	Fixed comp3 overload(slave)
61	**34**	High pressure too high(slave)
62	**35**	Sensor broken, high pressure(slave)
63	**36**	Discharge temp too high(slave)
64	**40**	Super heat too low(slave)
65	**41**	Low pressure too low(slave)
66	**42**	Sensor broken, low pressure(slave)

Figure 8: MDS Wired Controller (MC301) Error Code

Possible Root Caused and Troubleshooting Guide

The following table shows some possible caused when certain error code appeared. However, this can only be use as reference due to every installation is different and the cause is possible different also.

Code	Malfunction instruction	Main cause		Action
E0	System malfunction	High pressure malfunction occur 3 times within 1 hours;	1. Outdoor unit motor broken (cooling);	Check outdoor unit and solve the problem
			2. Outdoor circulating air short (cooling)	
			3. Outdoor heat exchanger too dirty (cooling);	
			4. Outdoor ball valve not turn on (heating);	Check if the ball valve switched on completely
			5. Indoor circulating air short (heating);	Check indoor unit and solve it
			6. Indoor heat exchanger too dirty (heating);	
			7. Indoor unit filter web blocked (heating);	
			8. Indoor unit EXV not turn on properly (heating);	Check EXV box and controller to solve it
			9. Too much refrigerant;	Properly release some refrigerant.
			10. Outdoor unit PCB high pressure output port malfunction;	Change PCB
			11. Pressure sensor broken;	Change pressure sensor
			12. Pressure switch broken.	Change pressure switch
		Low pressure malfunction occur 3 times within 1 hours;	1. Outdoor ball valve not turn on (cooling);	Check if the ball valve switched on completely
			2 .Refrigerant leakage or shortage;	Properly refill some refrigerant.
			3. Outdoor unit PCB low pressure output port malfunction;	Change PCB
			4. Low pressure sensor broken.	Change pressure sensor
		Too high discharge temperature occur once;	1. Outdoor unit motor broken (cooling);	Check outdoor unit and solve it
			2. Outdoor circulating air short (cooling);	
			3. Outdoor heat exchanger too dirty (cooling);	
			4. Outdoor unit EXV not turn on properly (heating);	Check EXV and solve it
			5. Indoor unit EXV not turn on properly ;	
			6. Refrigerant leakage or shortage;	Properly add some refrigerant.
			7. Outdoor ball valve not turns on.	Check if the ball valve switched on completely
		Compressor overload protector shut and occurs 3 times.	1. Too much current flow in the compressor;	Check if the compressor running normal, if refrigerant is added too much
			2. Compressor overload protector protecting value wrongly set	Check overload protecting parameter and set it properly
E1	TH1 open/ short circuit (discharge T.)	Outdoor discharge temperature sensor TH1 broken or loose		Check if resistance
E2	TH2 open/ short circuit (1# inlet coil)	Outdoor 1# condenser inlet coil temperature sensor TH2 broken or loose		Value is proper or change sensor
E3	TH3 open/ short circuit (1# midlet coil)	Outdoor 1# condenser midlet coil temperature sensor TH3 broken or loose		
E4	TH4 open/short circuit (2# inlet coil)	Outdoor 2# condenser inlet coil temperature sensor TH4 broken or loose		
E5	TH5 open/short circuit (2# midlet coil)	Outdoor 2# condenser midlet coil temperature sensor TH5 broken or loose		
E6	TH6 open/short circuit (3# inlet coil)	Outdoor 3# condenser inlet coil temperature sensor TH6 broken or loose		
E7	TH7 open/short circuit (1# midlet coil)	Outdoor 3# condenser midlet coil temperature sensor TH7 broken or loose		
E8	TH8 open/short circuit (ambient T.)	Outdoor ambient temperature sensor TH8 broken or loose		
E9	TH9 open/short circuit (outlet T.)	Outdoor outlet coil temperature sensor TH9 broken or loose		
EA	TH10 open/short circuit (sub-cool outlet)	Outdoor sub-cool outlet temperature sensor TH10 broken or loose		
EB	TH11 open/short circuit (sub-cool suction)	Outdoor sub-cool suction temperature sensor TH11 broken or loose		
EC	TH12 open/ short circuit (suction)	Outdoor return air temperature sensor TH12 broken or loose		
EF	Emergency run	On the premise that part of the indoor unit communication malfunction.		Check the malfunctioned indoor units and to solve it; Change sensor TH12
		Note: System will shut down if the following occur.		
		1. System sub heat _1_ for 15 minutes;		
		2. TH12 malfunctions.		

Code	Malfunction instruction	Main cause	Action
F0	Outdoor storage Malfunction	1. Outdoor PCB chip read faultily at the very beginning when poweron;	Press the outdoor reset button
		2. Outdoor PCB chip broken.	Change PCB
F1	Indoor inlet coil sensor malfunction	Indoor units Tin sensor broken or loose	Check if resistance
F2	Indoor midlet coil sensor malfunction	Indoor units Tmid sensor broken or loose	value is proper or change sensor
F3	Indoor outlet coil sensor malfunction	Indoor units Tout sensor broken or loose	
F4	Indoor return air sensor broken	Indoor units Troom sensor broken or loose	
F5	Indoor supply air sensor broken	Indoor units Troom sensor broken or loose	Check communication wire and solve it
F6	Indoor and controller communication malfunction	1. Wired controller communication wire not connected or loose	Change Wired controller
		2. Wired controller broken	Change outdoor PCB
		3. Outdoor PCB broken	
F7	Ambient temperature exceed running range	1. Outdoor ambient temperature exceed running range:	Not run to protect units
		a. cooling running range 0_48_,	
		b. heating running range -15~30_;	
		2. Outdoor circulating air short:	Check outdoor units and solve it
		a. cause outdoor ambient temperature rising to exceed running range when cooling;	
		b. cause outdoor ambient temperature falling to exceed running range when heating;	
F8	4-way valve malfunction	Preserved	
F9	Refrigerant leak	Preserved	
FA	Wired controller storage broken	1. Overflow switch broken;	Press the reset button on the wired controller
		2. Pump broken	Change wired controller
FB	Pump malfunction (indoor drain pump)	1. Data read faultily at the very beginning when power on;	Change overflow switch
		2. Chip broken.	Change pump
FC	Indoor and outdoor Communication malfunction	1. Indoor and outdoor Communication wire broken;	Check communication wire and solve it.
		2. Indoor and outdoor Communication wire loose;	
		3. Indoor and outdoor Communication wire A. B reversed.	
		4. Communication wire too long, should less than 1000 m.	
		5. Outdoor PCB not power on.	Check power supply.
		6. Indoor and outdoor jump wire not correct, still on update status;	Check PCB.
		7. last indoor unit terminal resistance of communication wire not short-circuit;	
		8. Indoor and outdoor PCB program not compatible.	
		9. Indoor and outdoor PCB abnormal.	
FE	Master unit and slave unit communication malfunction.	1. master unit and slave unit Communication wire reversed;	Check communication wire and solve it.Check communication wire and solve it.
		2. master unit and slave unit Communication wire broken or loose;	
		3. Slave unit toggle switch set wrongly.	Check the toggle switch setting. All toggle switches should be the same except the master unit SW2.1 set to ON,.
H0	Digital compressor overloaded.	Digital compressor operating current too high, overload protector OL4 on.	1. Check if the overload protector current setting is correct according to wire diagram.
H1	Fixed compressor 1 overloaded.	Fixed compressor 1 operating current too high, overload protector OL1 on.	2. Check if the corresponding compressor resistance is abnormal.
H2	Fixed compressor 2 overloaded.	Fixed compressor 2 operating current too high, overload protector OL2 on.	
H3	Fixed compressor 3 overloaded.	Fixed compressor 3 operating current too high, overload protector OL3 on.	
H4	High pressure too high.	1. Outdoor motor broken(cooling)	Check outdoor and solve it.
		2. Outdoor circulating air short-circuit (cooling).	
		3. Outdoor heat exchanger too dirty (cooling);	
		4. Outdoor ball valve not on(heating);	Check if ball valve switched on completely.
		5. Indoor circulating air short-circuit (heating).	Check indoor unit and solve it.
		6. Indoor heat exchanger too dirty(heating)	
		7. Indoor unit filter blocked by dirt (heating).	
		8. Indoor EXV not on properly (heating).	Check EXV and controller and solve it
		9. Refrigerant over charged.	Release some refrigerant. properly
		10. Outdoor PCB high pressure output port abnormal.	Change PCB
		11. Pressure sensor broken.	Change pressure sensor.
		12. Pressure switch broken.	Change pressure switch.

Code	Malfunction instruction	Main cause	Action
H5	High pressure sensor malfunction.	1. High pressure sensor communication wire broken	Check if high pressure sensor resistance is normal and solve it.
		2. Outdoor PCB HS port broken.	Change PCB
H6	Discharge temperature too high.	1. Outdoor motor broken(cooling)	Check outdoor and solve it.
		2. Outdoor circulation air short-circuit(cooling)	
		3. Outdoor heat exchanger too dirty(cooling)	
		4. Outdoor EXV not on properly(heating)	Check EXV and solve it.
		5. Indoor EXV not on properly(heating)	
		6. Refrigerant leakage or insufficient.	Refill some refrigerant properly
		7. Outdoor ball valve not on.	Check if ball valve switched on completely.
L0	Super heat protecting value too small.	1. Indoor motor not work when cooling	Check motor and solve it.
		2. Indoor EXV opening degree abnormal when cooling.	1. Check if indoor coil sensor loose or broken.
			2. Check if EXV abnormal.
		3. Outdoor motor not work when heating.	Check outdoor motor connecting wire and operation condition.
		4. Outdoor EXV opening degree abnormal when heating.	1. Check if outdoor sensor TH12 loose or broken.
			2. Check if EXV abnormal.
		5. Low pressure sensor abnormal;	Check low-pressure sensor.
		6. Refrigerant over charged.	Release some refrigerant.
L1	Low pressure too low.	1. Outdoor ball valve not on(heating)	Check if ball valve switched on completely.
		2. Outdoor heat exchanger efficiency too low when heating.	Check outdoor and solve it.
		3. Outdoor motor run abnormally when heating.	Check outdoor motor and solve it.
		4. Refrigerant leakage or insufficient.	Refill some refrigerant
		5. Outdoor PCB low pressure output port abnormal	Change PCB
		6. Low pressure sensor broken	Change pressure sensor
L2	Low pressure sensor broken	1. Low pressure sensor connecting wire broken.	Check if low-pressure sensor resistance value is normal and solve it.
		2. Outdoor PCB LS port broken.	Change PCB
L3	Indoor and outdoor communication	Outdoor work normal, but all indoor communication abnormal.	Check if communication wire normal
			Check if indoor PCB normal.
10	System malfunction (slave unit)	1. Slave unit high pressure malfunction occurred 3 times.	Reference 2.1.1 E0 trouble
		2. Low pressure malfunction occurred 3 times.	
		3. Discharge temp too high 1 times	
		4. Compressor overload protector jumped for 3 times.	
11	TH1 open/short -circuit (slave unit discharge)	Slave unit discharge temp. sensor TH1 broken or loose.	
12	TH2 open/short-circuit (slave unit 1# inlet coil)	Slave unit 1# inlet coil temp. sensor TH2 broken or loose.	Check if resistance properly choose, or change sensor.
13	TH3 open/short-circuit (slave unit 1# midlet coil)	Slave unit 1# midlet coil temp. sensor TH3 broken or loose.	
14	TH4 open/short -circuit (slave unit 2# inlet coil)	Slave unit 2# inlet coil temp. sensor TH4 broken or loose.	
15	TH5 open/short-circuit (slave unit 2# midlet coil)	Slave unit 2# midlet coil temp. sensor TH5 broken or loose.	
16	TH6 open/short-circuit (slave unit 3# inlet coil)	Slave unit 3# inlet coil temp. sensor TH4 broken or loose.	
17	TH7 open/short -circuit (slave unit 3# midlet coil)	Slave unit 3# midlet coil temp. sensor TH7 broken or loose.	
18	TH8 open/short -circuit (slave unit ambient temp.)	Slave unit ambient temp. sensor TH8 broken or loose.	
19	TH9 open/short -circuit (slave unit total outlet coil)	Slave unit outlet coil temp. sensor TH9 broken or loose.	
1A	TH10 open/ short-circuit (slave unit sub-cooling outlet)	Slave unit sub-cooling outlet coil temp. sensor TH10 broken or loose.	
1B	TH11 open/ short-circuit (slave unit super-cooling suction temp.)	Slave unit super-cooling suction temp. sensor TH11 broken or loose.	
1C	TH12 open/ short-circuit (slave unit suction temp)	Slave unit suction temp. sensor TH12 broken or loose.	
1F	Emergency run	Premise: part indoor communication failure.	Check malfunctioned indoor units and solve it.
		1. Slave unit suction super-heat less than 1_ for 15 minutes persistently.	Refrigerant over charged.
		2. Slave unit TH12 malfunction.	Solve TH12 problem.

Code	Malfunction instruction	Main cause	Action
20	Outdoor storage malfunction (slave unit)	1. Slave unit PCB chip data read failure by outdoor unit when power on.	Press “reset” button on slave unit PCB
		2. Slave unit PCB chip broken.	Change slave unit PCB
27	Ambient temp. is out of operation limit range. (slave unit)	1. Ambient temp. is out of operation limit range:	Not run to protect units
		a. Cooling ambient temp. range: 0_48_	
		b. Heating ambient temp. range: -15~30_	
		2. Outdoor slave unit circulating air short-circuit:	Check outdoor and solve it.
		a. Result in ambient temp. raising to exceed operation limit range when cooling;	
		b. Result in ambient temp. falling down to exceed operation limit range when heating;	
28	4-way valve malfunction	Preserved	
29	Refrigerant leakage	Preserved	
30	Digital compressor overloaded (slave unit)	Fixed compressor 4 operating current too high, overload protector OL4 on	Check if the overload protector current setting is correct according to wire diagram
31	Fixed compressor 1 overloaded (slave unit)	Fixed compressor 1 operating current too high, overload protector OL1 on	Check if corresponding compressor resistance is normal.
32	Fixed compressor 2 overloaded (slave unit)	Fixed compressor 2 operating current too high, overload protector OL2 on	
33	Fixed compressor 3 overloaded (slave unit).	Fixed compressor 3 operating current too high, overload protector OL3 on	
34	High pressure too high (slave unit)	1. Slave unit motor broken (cooling)	Check slave unit and solve it
		2. Slave unit circulation air short-circuit (cooling)	
		3. Slave unit heat exchanger too dirty (cooling)	
		4. Slave unit ball valve not on (heating)	Check if ball valve switched on completely.
		1. Indoor circulation air short-circuit (heating)	Check indoor and solve it.
		2. Indoor heat-exchanger too dirty (heating)	
		3. Indoor unit filter blocked by dirt (heating).	
		4. Indoor EXV not switched on properly (heating).	Check EXV and controller then solve it
		5. Refrigerant over charged.	Release some refrigerant properly
		6. Slave unit PCB high pressure output port abnormal.	Change slave unit PCB
		7. Slave unit pressure sensor broken	Change slave unit pressure sensor.
		8. Slave unit Pressure switch broken	Change slave unit pressure switch
35	High pressure sensor malfunction. (slave unit).	1. Slave unit high pressure sensor connecting wire broken	Check if slave unit high-pressure sensor resistance value is normal and solve it.
		2. Slave unit PCB HS port broken.	Replace slave unit PCB
36	Discharge temperature too high (slave unit).	Preserved	
40	Super-heat value too small so protect (slave unit)	1. Indoor motor not work when cooling	Check motor and solve it.
		2. Indoor EXV opening degree abnormal when cooling.	1. Check if sensor on indoor coil loose or broken.
			2. Check if EXV normal.
		3. Outdoor motor not work when heating	Check outdoor motor connecting wire and operating condition.
		4. Slave unit EXV opening degree abnormal when heating	1. Check if outdoor TH12 sensor loose or broken.
			2. Check if EXV abnormal.
		5. Slave unit low pressure sensor abnormal	Check slave unit low pressure sensor.
		6. Refrigerant over charged	Release some refrigerant properly.
41	Low pressure too low. (slave unit)	1. Slave unit ball valve not switched on(heating)	Check if ball valve switched on completely.
		2. Slave unit heat-exchanger efficiency too low when heating	Check outdoor and solve it.
		3. Slave unit motor run abnormally when heating.	Check outdoor motor and solve it.
		4. Refrigerant leaked or insufficient charged	Refill some refrigerant properly
		5. Slave unit PCB low pressure output port abnormal	Change PCB
		6. Slave unit Low pressure sensor broken	Change pressure sensor
42	Low pressure sensor broken (slave unit)	1. Slave unit Low pressure sensor connecting wire broken.	Check if low-pressure sensor resistance value is normal and solve it.
		2. Slave unit PCB LS port broken.	Change PCB

Appendix

Appendix I - R22 MDS A Series Cooling Cycle Reference

Item \ Model				030		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	015 | 020	015 | 020	015 | 020
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	2.6	2.6	2.6
Outdoor Unit	Total Current		A	13.0	20.0	21.0
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	150 | 150	250 | 250	400 | 400
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	11.5	19	25
	Low Pressure			4.1	4.2	5.2
Temp	Outdoor Unit	Discharge (TH1)	°C	60.0	95.0	98.0
		Suction (TH12)		10.0	15.0	15.0
		Compressor Bottom		45.0	60.0	65.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item \ Model				040		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	4	4	4
		Quantity in Operation		4	4	4
		Model	-	010 | 010 | 010 | 010	010 | 010 | 010 | 010	010 | 010 | 010 | 010
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.7	4.7	4.7
Outdoor Unit	Total Current		A	12.5	19.0	20.5
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	150 | 150 | 150 | 150	250 | 250 | 250 | 250	400 | 400 | 400 | 400
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	11.0	17.5	23.0
	Low Pressure			4.8	5.0	6.5
Temp	Outdoor Unit	Discharge (TH1)	°C	65.0	85.0	97.0
		Suction (TH12)		12.0	17.0	25.0
		Compressor Bottom		55.0	85.0	75.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item \ Model				050		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	025 | 025	025 | 025	025 | 025
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.7 / 4.9	4.7 / 4.9	4.7 / 4.9
Outdoor Unit	Total Current		A	13.0 / 5.5	24.5 / 8.5	26.0 / 9.5
	Volts		V	220 / 380	220 / 380	220 / 380
EXV Opening	Indoor Unit		STEP	150 | 150	250 | 250	350 | 350
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	11.0	18.0	24.0
	Low Pressure			4.6	4.9	6.5
Temp	Outdoor Unit	Discharge (TH1)	°C	70.0	90.0	100.0
		Suction (TH12)		12.0	15.0	20.0
		Compressor Bottom		45.0	55.0	65.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item \ Model				060		
Condition	Ambient Temp	Indoor	DB / WB	21/15	27/19	32/23
		Outdoor		18	35	43
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	020 | 040	020 | 040	020 | 040
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.0	5.0	5.0
Outdoor Unit	Total Current		A	7.5	11.0	12.0
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	150 | 150	250 | 250	300 | 300
	S.C (EXV4)			-	-	-
Pressure	High Pressure		Bar	10.5	18.0	24.0
	Low Pressure			4.4	4.6	6.2
Temp	Outdoor Unit	Discharge (TH1)	°C	65.0	90.0	98.0
		Suction (TH12)		10.0	12.0	18.0
		Compressor Bottom		45.0	55.0	70.0
	Indoor Unit	Coil In (Ti)		5.0	9.0	16.0
		Coil Mid (Tm)		5.5	9.5	16.5
		Coil Out (To)		7.5	10.5	17.5

Item \ Model				070											
Condition	Ambient Temp	Indoor	DB / WB	21/15				27/19				32/23			
		Outdoor		18				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity in Operation		4				4				4			
		Model	-	015	015	020	020	015	015	020	020	015	015	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	5.5				5.5				5.5			
Outdoor Unit	Total Current		A	9.5				11.5				14.0			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	150	150	150	150	250	250	250	250	400	400	350	350
	S.C (EXV4)			-				-				-			
Pressure	High Pressure		Bar	16.0				18.5				25.0			
	Low Pressure			4.2				5.0				6.0			
Temp	Outdoor Unit	Discharge (TH1)	°C	74.0				90.0				98.0			
		Suction (TH12)		12.0				16.0				16.0			
		Compressor Bottom		40.0				55.0				65.0			
	Indoor Unit	Coil In (Ti)		6.5				10.0				15.5			
		Coil Mid (Tm)		7.0				10.0				16.0			
		Coil Out (To)		7.5				10.5				17.5			

Appendix II - R22 MDS B Series Cooling Cycle Reference

Item \ Model (MDS B/BR)				080											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.5				10.5				10.5			
Outdoor Unit	Total Current		A	11.0				14.6				18.6			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	120	120	120	120	158	158	158	158	174	174	174	174
	S.C(EXV4)			102				110				115			
Pressure	High Pressure		bar	15.1				18.4				21.6			
	Low Pressure			3.8				4.7				5.1			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	81.3				95.3				103.3			
		S.C Inlet(TH9)		30.0				42.0				49.0			
		S.C Outlet(TH10)		15.0				29.0				38.0			
		S.C Bypass Outlet(TH11)		29.2				41.2				48.2			
		Suction(TH12)		12.5				15.8				17.0			
		Compressor Bottom		37.7				43.0				46.2			
	Indoor Unit	Coil In(Ti)		5.0				8.3				9.5			
		Coil Mid(Tm)		4.7				8.0				9.2			
		Coil Out(To)		5.3				8.6				9.9			

Item \ Model (MDS B/BR)				100											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	025	030	025	030	025	030	025	030	025	030	025	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.0				12.0				12.0			
Outdoor Unit	Total Current		A	12.7				16.8				21.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	160	113	160	113	198	151	198	151	214	167	214	167
	S.C(EXV4)			120				128				133			
Pressure	High Pressure		bar	15.0				18.4				21.5			
	Low Pressure			4.1				5.0				5.4			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	79.2				93.2				101.2			
		S.C Inlet(TH9)		31.5				43.5				51.5			
		S.C Outlet(TH10)		17.1				31.1				40.1			
		S.C Bypass Outlet(TH11)		27.7				39.7				47.7			
		Suction(TH12)		12.4				15.7				16.9			
		Compressor Bottom		36.7				42.0				45.2			
	Indoor Unit	Coil In(Ti)		6.4				9.7				10.9			
		Coil Mid(Tm)		6.7				10.0				11.2			
		Coil Out(To)		7.3				10.6				11.8			

Item \ Model (MDS B/BR)				120											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	030	030	030	030	030	030	030	030	030	030	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	15.0				15.0				15.0			
Outdoor Unit	Total Current		A	14.2				18.8				24.0			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	113	113	113	113	151	151	151	151	167	167	167	167
	S.C(EXV4)			153				161				166			
Pressure	High Pressure		bar	16.1				19.5				22.7			
	Low Pressure			3.7				4.6				5.0			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	84.0				98.0				106.0			
		S.C Inlet(TH9)		27.6				39.6				47.6			
		S.C Outlet(TH10)		9.5				23.5				32.5			
		S.C Bypass Outlet(TH11)		24.5				36.5				44.5			
		Suction(TH12)		11.8				15.1				16.3			
		Compressor Bottom		49.4				54.7				57.9			
	Indoor Unit	Coil In(Ti)		6.3				9.6				10.8			
		Coil Mid(Tm)		6.0				9.3				10.5			
		Coil Out(To)		6.8				10.1				11.3			

Item \ Model (MDS B/BR)				150											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	040	040	040	030	040	040	040	030	040	040	040
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	17.4				23.1				29.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	113	156	156	156	151	194	194	194	167	210	210	210
	S.C(EXV4)			135				143				148			
Pressure	High Pressure		bar	15.6				19.0				22.2			
	Low Pressure			4.2				5.1				5.5			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.3				92.3				100.3			
		S.C Inlet(TH9)		31.1				43.1				51.1			
		S.C Outlet(TH10)		16.9				30.9				39.9			
		S.C Bypass Outlet(TH11)		27.2				39.2				47.2			
		Suction(TH12)		12.4				15.7				16.9			
		Compressor Bottom		36.3				41.6				44.8			
	Indoor Unit	Coil In(Ti)		6.3				9.6				10.8			
		Coil Mid(Tm)		6.6				9.9				11.1			
		Coil Out(To)		7.2				10.5				11.7			

Item \ Model (MDS B/BR)				180											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	040	050	040	050	040	050	040	050	040	050	040	050
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	25.0				25.0				25.0			
Outdoor Unit	Total Current		A	21.3				28.2				36.0			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	156	201	156	201	194	239	194	239	210	255	210	255
	S.C(EXV4)			150				158				163			
Pressure	High Pressure		bar	14.2				17.6				20.8			
	Low Pressure			3.8				4.7				5.1			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	79.2				93.2				101.2			
		S.C Inlet(TH9)		30.0				42.0				50.0			
		S.C Outlet(TH10)		17.4				31.4				40.4			
		S.C Bypass Outlet(TH11)		27.2				39.2				47.2			
		Suction(TH12)		12.2				15.5				16.7			
		Compressor Bottom		35.7				41.0				44.2			
	Indoor Unit	Coil In(Ti)		6.1				9.4				10.6			
		Coil Mid(Tm)		6.2				9.5				10.7			
		Coil Out(To)		6.5				9.8				11.0			

Item \ Model (MDS B/BR)				200											
Condition	Ambient Temp.	Indoor	DB/WB	21/19				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	31.0				31.0				31.0			
Outdoor Unit	Total Current		A	23.5				31.1				39.7			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	201	201	201	201	239	239	239	239	255	255	255	255
	S.C(EXV4)			160				168				173			
Pressure	High Pressure		bar	14.2				17.6				20.8			
	Low Pressure			2.8				4.3				4.9			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	81.1				95.1				103.1			
		S.C Inlet(TH9)		30.7				42.7				50.7			
		S.C Outlet(TH10)		17.7				31.7				40.7			
		S.C Bypass Outlet(TH11)		20.6				32.6				40.6			
		Suction(TH12)		8.1				13.4				15.4			
		Compressor Bottom		25.1				32.4				36.4			
	Indoor Unit	Coil In(Ti)		4.6				9.9				11.9			
		Coil Mid(Tm)		4.7				10.0				12.0			
		Coil Out(To)		4.9				10.2				12.2			

Item \ Model (MDS B/BR)				220											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	37.0				37.0				37.0			
Outdoor Unit	Total Current		A	24.7				32.7				41.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	201	201	250	250	239	239	288	288	255	255	304	304
	S.C(EXV4)			170				178				183			
Pressure	High Pressure		bar	22.2				27.6				32.7			
	Low Pressure			2.8				4.3				4.9			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	81.7				95.7				103.7			
		S.C Inlet(TH9)		30.2				42.2				50.2			
		S.C Outlet(TH10)		16.1				30.1				39.1			
		S.C Bypass Outlet(TH11)		21.7				33.7				41.7			
		Suction(TH12)		7.9				13.2				15.2			
		Compressor Bottom		41.3				48.6				52.6			
	Indoor Unit	Coil In(Ti)		4.4				9.7				11.7			
		Coil Mid(Tm)		4.6				9.9				11.9			
		Coil Out(To)		4.7				10.0				12.0			

Item \ Model (MDS B/BR)				240											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	43.0				43.0				43.0			
Outdoor Unit	Total Current		A	29.1				38.5				49.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	250	250	250	250	288	288	288	288	304	304	304	304
	S.C(EXV4)			180				188				193			
Pressure	High Pressure		bar	12.5				17.9				23.0			
	Low Pressure			2.7				4.2				4.8			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	81.0				95.0				103.0			
		S.C Inlet(TH9)		31.1				43.1				51.1			
		S.C Outlet(TH10)		16.9				30.9				39.9			
		S.C Bypass Outlet(TH11)		23.5				35.5				43.5			
		Suction(TH12)		8.3				13.6				15.6			
		Compressor Bottom		42.2				49.5				53.5			
	Indoor Unit	Coil In(Ti)		4.5				9.8				11.8			
		Coil Mid(Tm)		4.6				9.9				11.9			
		Coil Out(To)		4.8				10.1				12.1			

For Master & Slave Combination (MDS260-320B/BR), please refer to the base model for reference. Example: MDS260B/BR, please refer to MDS120B/BR (Master) and MDS150B/BR (Slave) as reference.

Appendix III - R22 MDS A Series Heating Cycle Reference

Item \ Model				030		
Condition	Ambient Temp	Indoor	DB / WB	20/15	20/19	27/19
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	015 | 020	015 | 020	015 | 020
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	2.6	2.6	2.6
Outdoor Unit	Total Current		A	13.0	20.0	21.0
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	450 | 400	450 | 400	450 | 400
	EXV 1			150	300	350
Pressure	High Pressure		Bar	13.5	16.5	16.7
	Low Pressure			1.5	3.0	5.5
Temp	Outdoor Unit	Discharge (TH1)	°C	80.0	85.0	82.0
		Suction (TH12)		-17.0	3.0	14.6
		Compressor Bottom		40.0	50.0	65.0
	Indoor Unit	Coil In (Ti)		34.0	40.0	40.0
		Coil Mid (Tm)		35.5	45.0	45.0
		Coil Out (To)		65.0	75.0	75.0

Item \ Model				040		
Condition	Ambient Temp	Indoor	DB / WB	20/15	20/16	27/19
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	4	4	4
		Quantity in Operation		4	4	4
		Model	-	010 | 010 | 010 | 010	010 | 010 | 010 | 010	010 | 010 | 010 | 010
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.7	4.7	4.7
Outdoor Unit	Total Current		A	15.0	16.5	12.5
	Volts		V	220	220	220
EXV Opening	Indoor Unit		STEP	450 | 450 | 450 | 450	450 | 450 | 450 | 450	450 | 450 | 450 | 450
	EXV 1			170	250	200
Pressure	High Pressure		Bar	11.5	14.0	14.0
	Low Pressure			1.8	3.4	5.5
Temp	Outdoor Unit	Discharge (TH1)	°C	50.0	70.0	75.0
		Suction (TH12)		-16.3	4.0	17.0
		Compressor Bottom		21.5	42.0	54.0
	Indoor Unit	Coil In (Ti)		28.0	34.0	38.0
		Coil Mid (Tm)		30.0	38.0	40.0
		Coil Out (To)		50.0	65.0	70.0

Item \ Model				050		
Condition	Ambient Temp	Indoor	DB / WB	20/15	20/15	27/19
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	025 | 025	025 | 025	025 | 025
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	4.7 / 4.9	4.7 / 4.9	4.7 / 4.9
Outdoor Unit	Total Current		A	18.0 / 6.5	20.5 / 7.5	18.0 / 6.5
	Volts		V	220 / 380	220 / 380	220 / 380
EXV Opening	Indoor Unit		STEP	400 | 400	400 | 400	400 | 400
	EXV 1			150	250	200
Pressure	High Pressure		Bar	12.0	14.7	15.0
	Low Pressure			1.8	3.5	5.3
Temp	Outdoor Unit	Discharge (TH1)	°C	80.0	80.0	85.0
		Suction (TH12)		-10.0	4.0	12.0
		Compressor Bottom		12.0	35.0	45.0
	Indoor Unit	Coil In (Ti)		31.0	36.0	39.0
		Coil Mid (Tm)		32.0	39.0	41.0
		Coil Out (To)		60.0	70.0	72.0

Item \ Model				060		
Condition	Ambient Temp	Indoor	DB / WB	21/15	21/15	27/23
		Outdoor		-9	7/6	21/15
	Indoor Unit	Quantity	PC	2	2	2
		Quantity in Operation		2	2	2
		Model	-	020 | 040	020 | 040	020 | 040
	Piping	Main Pipe	m	5	5	5
		Branch Pipe		5	5	5
		Total Piping Length		22	22	22
	Refrigerant Volume		kg	5.0	5.0	5.0
Outdoor Unit	Total Current		A	7.5	8.5	9.5
	Volts		V	380	380	380
EXV Opening	Indoor Unit		STEP	400 | 400	400 | 400	400 | 400
	EXV 1			150	250	250
Pressure	High Pressure		Bar	12.5	16.5	16.0
	Low Pressure			1.8	3.4	5.8
Temp	Outdoor Unit	Discharge (TH1)	°C	58.0	80.0	83.0
		Suction (TH12)		-14.0	4.0	15.0
		Compressor Bottom		10.0	40.0	55.0
	Indoor Unit	Coil In (Ti)		28.0	36.0	39.0
		Coil Mid (Tm)		30.0	39.0	41.0
		Coil Out (To)		52.0	70.0	72.0

Item			Model	070											
Condition	Ambient Temp	Indoor	DB / WB	20/15				20/15				27/19			
		Outdoor		-9				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity in Operation		4				4				4			
		Model	-	015	015	020	020	015	015	020	020	015	015	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	5.5				5.5				5.5			
Outdoor Unit	Total Current		A	9.5				10.5				12.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	450	450	400	400	450	450	400	400	450	450	400	400
	EXV 1			150				250				258			
Pressure	High Pressure		Bar	12.1				15.5				19.7			
	Low Pressure			1.8				3.4				6.6			
Temp	Outdoor Unit	Discharge (TH1)	°C	75.0				85.0				95.0			
		Suction (TH12)		-14.0				6.0				13.0			
		Compressor Bottom		20.0				40.0				53.0			
	Indoor Unit	Coil In (Ti)		24.0				39.0				40.0			
		Coil Mid (Tm)		25.5				42.0				50.0			
		Coil Out (To)		58.0				70.0				85.0			

Appendix IV -R22 MDS B Series Heating Cycle Reference

Item \ Model (MDS B/BR)				080											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.5				10.5				10.5			
Outdoor Unit	Total Current		A	11.7				13.6				9.3			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	350	350	350	350	350	350	350
	S.C(EXV4)			167				149				111			
Pressure	High Pressure		bar	12.0				15.6				16.0			
	Low Pressure			2.0				3.3				4.8			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	70.1				81.6				57.1			
		S.C Inlet(TH9)		22.6				23.3				30.1			
		S.C Outlet(TH10)		23.3				26.2				33.0			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-8.3				3.9				10.5			
		Compressor Bottom		19.8				29.2				37.8			
	Indoor Unit	Coil In(Ti)		29.3				29.8				35.9			
		Coil Mid(Tm)		33.7				41.5				42.1			
		Coil Out(To)		59.6				70.1				64.1			

Item \ Model(MDS B/BR)				100											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	025	030	025	030	025	030	025	030	025	030	025	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.0				12.0				12.0			
Outdoor Unit	Total Current		A	13.5				15.7				10.7			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	350	350	350	350	350	350	350
	S.C(EXV4)			206				184				136			
Pressure	High Pressure		bar	11.9				17.7				18.3			
	Low Pressure			1.5				3.6				5.9			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	75.5				87.0				62.5			
		S.C Inlet(TH9)		22.8				23.5				30.3			
		S.C Outlet(TH10)		24.0				26.9				33.7			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-10.8				4.2				13.8			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		29.9				30.7				37.1			
		Coil Mid(Tm)		30.6				43.1				44.0			
		Coil Out(To)		55.5				72.3				66.5			

Item \ Model(MDS B/BR)				120											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	030	030	030	030	030	030	030	030	030	030	030
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	15.0				15.0				15.0			
Outdoor Unit	Total Current		A	14.4				16.7				11.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	350	350	350	350	350	350	350
	S.C(EXV4)			248				222				164			
Pressure	High Pressure		bar	11.5				17.2				17.8			
	Low Pressure			1.2				3.3				5.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	66.0				77.5				53.0			
		S.C Inlet(TH9)		22.7				23.4				30.2			
		S.C Outlet(TH10)		23.7				26.6				33.4			
		S.C Bypass Outlet(TH11)		18.4				22.0				30.1			
		Suction(TH12)		-11.0				4.0				13.6			
		Compressor Bottom		18.8				31.0				42.6			
	Indoor Unit	Coil In(Ti)		29.4				30.2				36.6			
		Coil Mid(Tm)		29.1				41.6				42.5			
		Coil Out(To)		53.1				69.9				64.1			

Item \ Model(MDS B/BR)				150											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	030	040	040	040	030	040	040	040	030	040	040	040
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	19.4				22.6				15.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	350	350	350	350	350	400	400	400	350	400	400	400
	S.C(EXV4)			288				257				190			
Pressure	High Pressure		bar	9.8				15.5				16.1			
	Low Pressure			1.2				3.3				5.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	69.0				80.5				56.0			
		S.C Inlet(TH9)		22.5				23.2				30.0			
		S.C Outlet(TH10)		23.9				26.9				33.7			
		S.C Bypass Outlet(TH11)		18.6				22.2				30.3			
		Suction(TH12)		-11.1				3.9				13.5			
		Compressor Bottom		19.1				31.3				42.9			
	Indoor Unit	Coil In(Ti)		29.7				30.5				36.9			
		Coil Mid(Tm)		29.5				42.0				42.9			
		Coil Out(To)		53.8				70.6				64.8			

Item \ Model(MDS B/BR)				180											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	040	050	040	050	040	050	040	050	040	050	040	050
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	25.0				25.0				25.0			
Outdoor Unit	Total Current		A	23.3				27.1				18.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			202				180				133			
Pressure	High Pressure		bar	12.3				18.0				18.6			
	Low Pressure			1.4				3.5				5.8			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.8				90.3				65.8			
		S.C Inlet(TH9)		24.3				25.0				31.8			
		S.C Outlet(TH10)		24.8				27.7				34.5			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-11.8				3.2				12.8			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		30.5				31.3				37.7			
		Coil Mid(Tm)		30.7				43.2				44.1			
		Coil Out(To)		61.7				78.5				72.7			

Item \ Model(MDS B/BR)				200											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	31.0				31.0				31.0			
Outdoor Unit	Total Current		A	25.3				29.4				20.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			231				206				152			
Pressure	High Pressure		bar	12.1				17.8				18.4			
	Low Pressure			1.2				3.4				5.7			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	70.5				82.0				57.5			
		S.C Inlet(TH9)		23.1				23.8				30.6			
		S.C Outlet(TH10)		24.2				27.1				33.9			
		S.C Bypass Outlet(TH11)		18.8				22.4				30.5			
		Suction(TH12)		-10.9				4.1				13.7			
		Compressor Bottom		19.3				31.6				43.2			
	Indoor Unit	Coil In(Ti)		29.9				30.7				37.1			
		Coil Mid(Tm)		29.8				42.3				43.3			
		Coil Out(To)		56.3				73.1				67.3			

Item \ Model(MDS B/BR)				220											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	37.0				37.0				37.0			
Outdoor Unit	Total Current		A	26.7				31.0				21.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			270				241				178			
Pressure	High Pressure		bar	13.0				18.7				19.3			
	Low Pressure			1.5				3.6				5.9			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	81.5				93.0				68.5			
		S.C Inlet(TH9)		22.8				23.5				30.3			
		S.C Outlet(TH10)		23.8				26.8				33.6			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-11.0				4.0				13.6			
		Compressor Bottom		19.0				31.2				42.8			
	Indoor Unit	Coil In(Ti)		29.6				30.4				36.8			
		Coil Mid(Tm)		31.3				43.8				44.8			
		Coil Out(To)		61.5				78.3				72.6			

Item \ Model(MDS B/BR)				240											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	43.0				43.0				43.0			
Outdoor Unit	Total Current		A	29.1				33.8				23.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			322				288				213			
Pressure	High Pressure		bar	11.8				17.6				18.2			
	Low Pressure			1.1				3.3				5.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	65.4				76.9				52.4			
		S.C Inlet(TH9)		22.5				23.2				30.0			
		S.C Outlet(TH10)		23.5				26.4				33.2			
		S.C Bypass Outlet(TH11)		18.2				21.8				29.9			
		Suction(TH12)		-11.1				4.0				13.6			
		Compressor Bottom		18.5				30.8				42.4			
	Indoor Unit	Coil In(Ti)		29.2				30.0				36.4			
		Coil Mid(Tm)		29.7				42.3				43.2			
		Coil Out(To)		54.5				71.3				65.6			

For Master & Slave Combination (MDS260-320BR), please refer to the base model for reference.
Example: MDS260BR, please refer to MDS120BR (Master) and MDS150BR (Slave) as reference

Appendix V -R410A MDS B Series Cooling Cycle Reference

Item \ Model(MDS B/BR)				080											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.8				10.8				10.8			
Outdoor Unit	Total Current		A	11.5				15.2				19.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	218	218	218	218	256	256	256	256	272	272	272	272
	S.C(EXV4)			99				107				112			
Pressure	High Pressure		bar	23.7				29.1				34.2			
	Low Pressure			7.2				8.7				9.3			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	74.7				88.7				96.7			
		S.C Inlet(TH9)		34.0				46.0				53.0			
		S.C Outlet(TH10)		19.8				33.8				42.8			
		S.C Bypass Outlet(TH11)		29.2				41.2				48.2			
		Suction(TH12)		9.0				14.3				16.3			
		Compressor Bottom		32.9				40.2				44.2			
	Indoor Unit	Coil In(Ti)		4.3				9.6				11.6			
		Coil Mid(Tm)		4.0				9.3				11.3			
		Coil Out(To)		4.8				10.1				12.1			

Item \ Model(MDS B/BR)				100											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	020	028	028	028	020	028	028	028	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.1				12.1				12.1			
Outdoor Unit	Total Current		A	12.7				16.8				21.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	293	293	293	218	331	331	331	256	347	347	347	272
	S.C(EXV4)			118				126				131			
Pressure	High Pressure		bar	23.2				28.6				33.7			
	Low Pressure			7.1				8.6				9.2			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	72.5				86.5				94.5			
		S.C Inlet(TH9)		32.0				44.0				52.0			
		S.C Outlet(TH10)		18.4				32.4				41.4			
		S.C Bypass Outlet(TH11)		28.0				40.0				48.0			
		Suction(TH12)		9.0				14.3				16.3			
		Compressor Bottom		31.7				39.0				43.0			
	Indoor Unit	Coil In(Ti)		4.5				9.8				11.8			
		Coil Mid(Tm)		4.2				9.5				11.5			
		Coil Out(To)		5.0				10.3				12.3			

Item \ Model(MDS B/BR)				120											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	035	028	028	028	035	028	028	028	035
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	13.5				13.5				13.5			
Outdoor Unit	Total Current		A	14.1				18.7				23.9			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	293	293	293	325	331	331	331	363	347	347	347	379
	S.C(EXV4)			134				142				147			
Pressure	High Pressure		bar	23.7				29.1				34.2			
	Low Pressure			7.1				8.6				9.2			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	74.7				88.7				96.7			
		S.C Inlet(TH9)		33.7				45.7				53.7			
		S.C Outlet(TH10)		19.6				33.6				42.6			
		S.C Bypass Outlet(TH11)		29.2				41.2				49.2			
		Suction(TH12)		9.0				14.3				16.3			
		Compressor Bottom		32.9				40.2				44.2			
	Indoor Unit	Coil In(Ti)		4.3				9.6				11.6			
		Coil Mid(Tm)		4.0				9.3				11.3			
		Coil Out(To)		4.8				10.1				12.1			

Item \ Model(MDS B/BR)				140											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	035	035	035	035	035	035	035	035	035	035
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				F			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	14.8				14.8				14.8			
Outdoor Unit	Total Current		A	16.5				21.8				27.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	325	325	325	325	363	363	363	363	379	379	379	379
	S.C(EXV4)			148				156				161			
Pressure	High Pressure		bar	23.3				28.7				33.8			
	Low Pressure			6.8				8.3				8.9			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	74.0				88.0				96.0			
		S.C Inlet(TH9)		33.0				45.0				53.0			
		S.C Outlet(TH10)		22.1				36.1				45.1			
		S.C Bypass Outlet(TH11)		31.8				43.8				51.8			
		Suction(TH12)		2.1				7.4				9.4			
		Compressor Bottom		29.2				36.5				40.5			
	Indoor Unit	Coil In(Ti)		3.0				8.3				10.3			
		Coil Mid(Tm)		3.1				8.4				10.4			
		Coil Out(To)		3.4				8.7				10.7			

Item \ Model(MDS B/BR)				160											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	045	045	035	035	045	045	035	035	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	15.5				15.5				15.5			
Outdoor Unit	Total Current		A	18.2				24.1				30.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	325	325	347	347	363	363	385	385	379	379	401	401
	S.C(EXV4)			161				169				174			
Pressure	High Pressure		bar	24.1				29.5				34.6			
	Low Pressure			6.7				8.2				8.8			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.0				92.0				100.0			
		S.C Inlet(TH9)		35.8				47.8				55.8			
		S.C Outlet(TH10)		18.4				32.4				41.4			
		S.C Bypass Outlet(TH11)		29.1				41.1				49.1			
		Suction(TH12)		2.0				7.3				9.3			
		Compressor Bottom		30.5				37.8				41.8			
	Indoor Unit	Coil In(Ti)		2.9				8.2				10.2			
		Coil Mid(Tm)		3.0				8.3				10.3			
		Coil Out(To)		3.3				8.6				10.6			

Item \ Model(MDS B/BR)				180											
Condition	Ambient Temp.	Indoor	DB/WB	21/15				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	045	045	045	045	045	045	045	045	045	045	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	16.2				16.2				16.2			
Outdoor Unit	Total Current		A	21.5				28.5				36.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	347	347	347	347	385	385	385	385	401	401	401	401
	S.C(EXV4)			172				180				185			
Pressure	High Pressure		bar	24.3				29.7				34.8			
	Low Pressure			6.7				8.2				8.8			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	79.0				93.0				101.0			
		S.C Inlet(TH9)		36.0				48.0				56.0			
		S.C Outlet(TH10)		18.6				32.6				41.6			
		S.C Bypass Outlet(TH11)		29.3				41.3				49.3			
		Suction(TH12)		1.9				7.2				9.2			
		Compressor Bottom		30.7				38.0				42.0			
	Indoor Unit	Coil In(Ti)		3.1				8.4				10.4			
		Coil Mid(Tm)		3.2				8.5				10.5			
		Coil Out(To)		3.5				8.8				10.8			

Item \ Model(MDS B/BR)				200											
Condition	Ambient Temp.	Indoor	DB/ WB	21/19				27/19				29/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	24.7				32.7				41.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	359	359	359	359	397	397	397	397	413	413	413	413
	S.C(EXV4)			219				227				232			
Pressure	High Pressure		bar	22.2				27.6				32.7			
	Low Pressure			6.4				7.9				8.5			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	70.1				84.1				92.1			
		S.C Inlet(TH9)		31.7				43.7				51.7			
		S.C Outlet(TH10)		17.7				31.7				40.7			
		S.C Bypass Outlet(TH11)		20.6				32.6				40.6			
		Suction(TH12)		3.1				8.4				10.4			
		Compressor Bottom		23.1				30.4				34.4			
	Indoor Unit	Coil In(Ti)		4.2				9.5				11.5			
		Coil Mid(Tm)		4.3				9.6				11.6			
		Coil Out(To)		4.5				9.8				11.8			

Item \ Model(MDS B/BR)				220											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	19.6				19.6				19.6			
Outdoor Unit	Total Current		A	27.0				35.7				45.6			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	359	359	218	218	397	397	256	256	413	413	272	272
	S.C(EXV4)			235				243				248			
Pressure	High Pressure		bar	22.5				27.9				33.0			
	Low Pressure			6.3				7.8				8.4			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	72.3				86.3				94.3			
		S.C Inlet(TH9)		32.1				44.1				52.1			
		S.C Outlet(TH10)		18.1				32.1				41.1			
		S.C Bypass Outlet(TH11)		21.7				33.7				41.7			
		Suction(TH12)		3.0				8.3				10.3			
		Compressor Bottom		24.4				31.7				35.7			
	Indoor Unit	Coil In(Ti)		4.1				9.4				11.4			
		Coil Mid(Tm)		4.3				9.6				11.6			
		Coil Out(To)		4.4				9.7				11.7			

Item \ Model(MDS B/BR)				240											
Condition	Ambient Temp.	Indoor	DB/ WB	27/19				27/19				27/19			
		Outdoor		21				35				43			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	21.5				21.5				21.5			
Outdoor Unit	Total Current		A	29.1				38.5				49.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	218	218	218	218	256	256	256	256	272	272	272	272
	S.C(EXV4)			251				259				264			
Pressure	High Pressure		bar	22.7				28.1				33.2			
	Low Pressure			6.2				7.7				8.3			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	73.3				87.3				95.3			
		S.C Inlet(TH9)		33.2				45.2				53.2			
		S.C Outlet(TH10)		19.2				33.2				42.2			
		S.C Bypass Outlet(TH11)		23.5				35.5				43.5			
		Suction(TH12)		2.9				8.2				10.2			
		Compressor Bottom		25.2				32.5				36.5			
	Indoor Unit	Coil In(Ti)		4.1				9.4				11.4			
		Coil Mid(Tm)		4.2				9.5				11.5			
		Coil Out(To)		4.4				9.7				11.7			

For Master & Slave Combination (5MDS260-500B/BR), please refer to the base model for reference.
Example: 5MDS260B/BR, please refer to 5MDS120B/BR (Master) and 5MDS140B/BR (Slave) as reference.
For 5MDS500B/BR, please refer to 5MDS240B/BR for both master and salve.

Appendix VI - R410A MDS B Series Heating Cycle Reference

Item \ Model(MDS B/BR)				080											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	020	020	020	020	020	020	020	020	020	020	020	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	10.8				10.8				10.8			
Outdoor Unit	Total Current		A	12.2				14.2				9.7			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			145				129				96			
Pressure	High Pressure		bar	22.3				28.0				28.7			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	77.6				89.1				64.6			
		S.C Inlet(TH9)		23.4				24.1				30.9			
		S.C Outlet(TH10)		25.9				28.8				35.6			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.9				31.2				42.8			
	Indoor Unit	Coil In(Ti)		31.9				32.7				39.1			
		Coil Mid(Tm)		34.5				47.0				47.9			
		Coil Out(To)		62.0				78.9				73.1			

Item \ Model(MDS B/BR)				100											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	020	028	028	028	020	028	028	028	020
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	12.1				12.1				12.1			
Outdoor Unit	Total Current		A	14.4				16.8				11.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			178				159				118			
Pressure	High Pressure		bar	22.6				28.3				29.0			
	Low Pressure			4.2				6.4				8.7			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.5				90.0				65.5			
		S.C Inlet(TH9)		23.7				24.4				31.2			
		S.C Outlet(TH10)		26.2				29.1				35.9			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		32.2				33.0				39.4			
		Coil Mid(Tm)		35.0				47.5				48.4			
		Coil Out(To)		62.8				79.7				73.9			

Item \ Model(MDS B/BR)				120											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	028	028	028	035	028	028	028	035	028	028	028	035
	Piping	Main Pipe	m	5				5				5			
		Branch Pipe		5				5				5			
		Total Piping Length		22				22				22			
	Refrigerant Volume		kg	13.5				13.5				13.5			
Outdoor Unit	Total Current		A	16.1				18.7				12.8			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			215				192				142			
Pressure	High Pressure		bar	22.2				27.9				28.5			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	77.2				88.7				64.2			
		S.C Inlet(TH9)		23.3				24.0				30.8			
		S.C Outlet(TH10)		25.8				28.7				35.5			
		S.C Bypass Outlet(TH11)		18.4				22.0				30.1			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.8				31.0				42.6			
	Indoor Unit	Coil In(Ti)		31.7				32.5				38.9			
		Coil Mid(Tm)		34.3				46.8				47.7			
		Coil Out(To)		61.7				78.5				72.7			

Item \ Model(MDS B/BR)				140											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	035	035	035	035	035	035	035	035	035	035
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	14.8				14.8				14.8			
Outdoor Unit	Total Current		A	18.1				21.1				14.4			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			157				140				104			
Pressure	High Pressure		bar	22.4				28.2				28.8			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.1				89.6				65.1			
		S.C Inlet(TH9)		23.5				24.2				31.0			
		S.C Outlet(TH10)		26.1				29.0				35.8			
		S.C Bypass Outlet(TH11)		18.6				22.2				30.3			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.1				31.3				42.9			
	Indoor Unit	Coil In(Ti)		32.0				32.8				39.2			
		Coil Mid(Tm)		34.7				47.3				48.2			
		Coil Out(To)		62.4				79.3				73.5			

Item			Model(MDS B/BR)	160											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	035	035	045	045	035	035	045	045	035	035	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	15.5				15.5				15.5			
Outdoor Unit	Total Current		A	20.3				23.6				16.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			178				159				118			
Pressure	High Pressure		bar	22.3				28.0				28.7			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	77.6				89.1				64.6			
		S.C Inlet(TH9)		23.4				24.1				30.9			
		S.C Outlet(TH10)		25.9				28.8				35.6			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.9				31.2				42.8			
	Indoor Unit	Coil In(Ti)		31.9				32.7				39.1			
		Coil Mid(Tm)		34.5				47.0				47.9			
		Coil Out(To)		62.0				78.9				73.1			

Item			Model(MDS B/BR)	180											
Condition	Ambient Temp.	Indoor	DB/ WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	045	045	045	045	045	045	045	045	045	045	045	045
	Piping	Main Pipe	m	10				10				10			
		Branch Pipe		8				8				8			
		Total Piping Length		32				32				32			
	Refrigerant Volume		kg	16.2				16.2				16.2			
Outdoor Unit	Total Current		A	24.5				28.5				19.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			200				179				132			
Pressure	High Pressure		bar	22.6				28.3				29.0			
	Low Pressure			4.2				6.4				8.7			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.5				90.0				65.5			
		S.C Inlet(TH9)		23.7				24.4				31.2			
		S.C Outlet(TH10)		26.2				29.1				35.9			
		S.C Bypass Outlet(TH11)		18.7				22.3				30.4			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.2				31.5				43.1			
	Indoor Unit	Coil In(Ti)		32.2				33.0				39.4			
		Coil Mid(Tm)		35.0				47.5				48.4			
		Coil Out(To)		62.8				79.7				73.9			

Item \ Model(MDS B/BR)				200											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	050	050	050	050	050	050	050	050	050	050
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	18.0				18.0				18.0			
Outdoor Unit	Total Current		A	26.7				31.0				21.2			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			178				159				118			
Pressure	High Pressure		bar	22.7				28.4				29.0			
	Low Pressure			4.3				6.4				8.7			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	78.8				90.3				65.8			
		S.C Inlet(TH9)		23.7				24.4				31.2			
		S.C Outlet(TH10)		26.3				29.2				36.0			
		S.C Bypass Outlet(TH11)		18.8				22.4				30.5			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.3				31.6				43.2			
	Indoor Unit	Coil In(Ti)		32.3				33.1				39.5			
		Coil Mid(Tm)		35.1				47.6				48.5			
		Coil Out(To)		63.1				79.9				74.2			

Item \ Model(MDS B/BR)				220											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	050	050	060	060	050	050	060	060	050	050	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	19.6				19.6				19.6			
Outdoor Unit	Total Current		A	29.1				33.8				23.1			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			196				175				129			
Pressure	High Pressure		bar	22.3				28.1				28.7			
	Low Pressure			4.2				6.3				8.6			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	77.7				89.2				64.7			
		S.C Inlet(TH9)		23.4				24.1				30.9			
		S.C Outlet(TH10)		25.9				28.9				35.7			
		S.C Bypass Outlet(TH11)		18.5				22.1				30.2			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		19.0				31.2				42.8			
	Indoor Unit	Coil In(Ti)		31.9				32.7				39.1			
		Coil Mid(Tm)		34.5				47.1				48.0			
		Coil Out(To)		62.1				79.0				73.2			

Item \ Model(MDS B/BR)				240											
Condition	Ambient Temp.	Indoor	DB/WB	20				20				27			
		Outdoor		-5/-6				7/6				21/15			
	Indoor Unit	Quantity	PC	4				4				4			
		Quantity In Operation		4				4				4			
		Model	-	060	060	060	060	060	060	060	060	060	060	060	060
	Piping	Main Pipe	m	15				15				15			
		Branch Pipe		10				10				10			
		Total Piping Length		40				40				40			
	Refrigerant Volume		kg	21.5				21.5				21.5			
Outdoor Unit	Total Current		A	30.9				35.9				24.5			
	Volts		V	380				380				380			
EXV Opening	Indoor Unit		STEP	400	400	400	400	400	400	400	400	400	400	400	400
	S.C(EXV4)			215				192				142			
Pressure	High Pressure		bar	21.9				27.7				28.3			
	Low Pressure			4.1				6.2				8.5			
Temp.	Outdoor Unit	Discharge(TH1)	˚C	76.5				88.0				63.5			
		S.C Inlet(TH9)		23.1				23.8				30.6			
		S.C Outlet(TH10)		25.5				28.5				35.3			
		S.C Bypass Outlet(TH11)		18.2				21.8				29.9			
		Suction(TH12)		-12.5				2.5				12.1			
		Compressor Bottom		18.5				30.8				42.4			
	Indoor Unit	Coil In(Ti)		31.4				32.2				38.6			
		Coil Mid(Tm)		33.9				46.4				47.3			
		Coil Out(To)		61.0				77.9				72.1			

For Master & Slave Combination (5MDS260-500BR), please refer to the base model for reference.
Example: 5MDS260BR, please refer to 5MDS120BR (Master) and 5MDS140BR (Slave) as reference.
For 5MDS500BR, please refer to 5MDS240BR for both master and salve.

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